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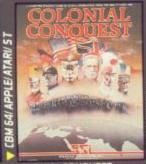
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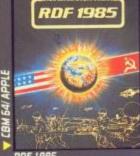


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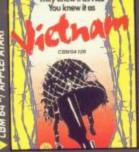
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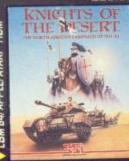
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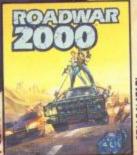
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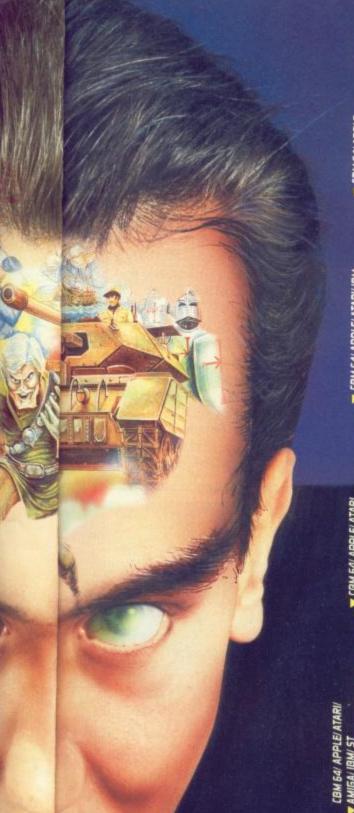
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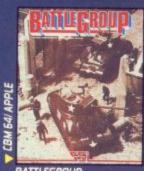


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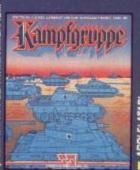


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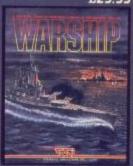


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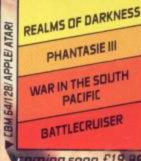
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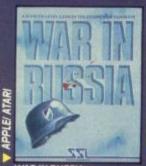




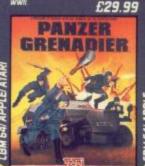
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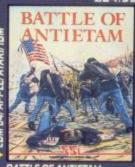


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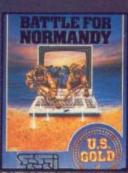


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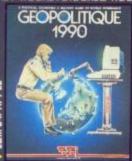








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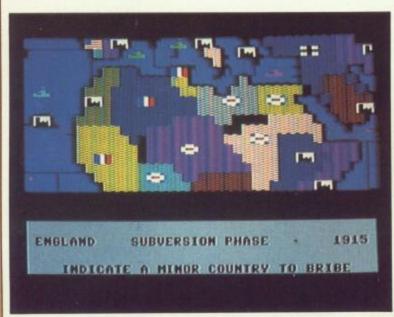


STRATEGIC SIMULATIONS INC

VOLUME 3 NUMBER 9

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DATA STATEMENTS

Thalamus has launched Delta, a new game from Sanxion programmer Stavros Fasoulas. Delta is described as a 'progressive' shoot 'em up and has 32 levels and 162 different alien attack waves. It's available for the C64 on cassette at £9.99 and disk at £14.99.

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Sanxion and Delta will soon appear in the US on the Electronic Arts label. Paul Cooper of Thalamus said: "We were approached by a number of leading US software hoses but felt that Electronic Arts could promote our products more successfully. Thalamus looks forward to working with Electronic Arts in this new venture".

Gremlin has also crossed the Atlantic to strike a new business deal with Canadian Software development company, Acme Animation, headed by games designer Michael Bate. There are two programs already being developed, a flight simulator and an arcade game which are due for release at the end of this year. Gremlin will be looking for programmers to send to Canada for the new project.

Gremlin's Ian Stewart said: "The opportunity of working with Michael Bate, gives us the opening into the US market that we have been waiting for. This will establish Gremlin as an international company and is only the start of something that will be envied by the industry during 1987!"

Michael Bate commented: "The chance to be associated with one of the world's most dynamic companies was an opportunity I couldn't pass up."

Please Note

We have been informed that many people are getting *Micronet's* phone number wrong and annoying the neighbours with their calls. Please note that *Micronet* can be contacted on: 01 278 3143.

You have been called in to save the land of Ket from viscious attacks from the Mad Monks in the mountains.

The Lords of Ket send you on a mission to kill King/High Priest Vran Verusabel and Delphia, the High Princess of the Temple of Vran. Only with their deaths can you stop the attacks on Ket.

The entire trilogy is available on one cassette for the C64 at £7.95. The Commodore version also includes a special feature: auto map drawing. As you explore in each adventure a map of your travels builds up on the screen.

Virgin Games has released a new compilation, Now Games 4. The new package features Dan Dare, Hacker, Back to the Future, Mission Omega and Jonah Barrington's Squash and is available for the C64 at £9.95.

Virgin's Nick Alexander said: "We are already into six figure sales with the Now series and *Now Games 4* is the strongest line up yet. Now is a wow!"

Budget software house Code Masters has added another title to its C64 list. Armourdillo features a halfman, half animal armour plated living tank as the plant Mobanti's last hope of defence against evil aliens. Written by Giulio Zicchi, Armourdillo is a fast scrolling shoot 'em up featuring music and sound effects.

Touchline

Incentive Software: 2 Minerva House, Calleva Park, Aldermaston, Berks RG7 4QW. Tel: 07356 77288. Virgin Games: 2-4 Vernon Yard, Portobello Road, London W11 2DX. Tel: 01 727 8070. Code Masters: 1 Beaumont Business Centre, Beaumont Close, Banbury, Oxon OX16 7RT.

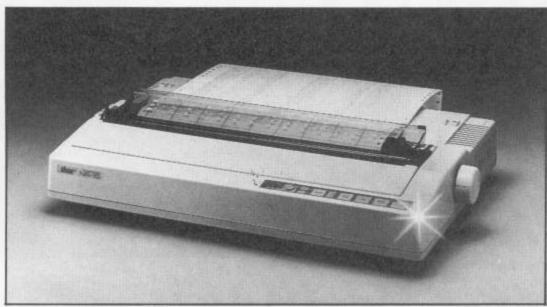


Virgin Games

Incentive has recently released its *Ket Trilogy* as a games package on the cassette.

The Trilogy is comprised of three seperate adventures: Mountains of Ket, Temple of Vran and The Final Mission.

F M



The Star NR-15

Print Outs

Star Micronics has launched its latest dot-matrix machine the NR-15. It provides draft printing at 240 characters per second (cps) and near letter quality output at 60cps.

A font control panel makes the new printer extremely simple to use by providing touch sensitive control for the major functions.

As standard the NR-15 is equipped with both tractor feed and semiautomatic sheet feed, there is also an optional, low-cost automatic cut-sheet feeder.

Another feature is slot interface card system, which makes system connection problems relatively easy to solve. By selecting the right card the user is guaranteed a perfect match with his computer system.

The NR-15 is priced at £589.

Citizen Europe has also added to

its product range. The MSP 50 and MSP 55, new nine pin dot matrix printers.

The new printers are 80 and 136 column and offer the user top quality, high speed printing with optional colour enhancements for professional data processing.

Both printers carry push and pull feed tractor as standard with bottom feed to aid multi-part stationary feeding. Both will be available this summer. The MSP 50 will cost £695 (ex VAT) and the MSP 55 will cost £525 . (ex VAT).

Touchline

Star Micronics: Craven House, 40 Uxbridge Road, Ealing, London W5 2BS. Tel: 01 840 1800. Citizen: Fitzroy PR. 32 Fitzroy Square, London W1P 5HH. Tel: 01 388 9871 or 0895 72621.

Amiga News

Micropose has launched Silent Service for the Amiga.

The game is a simulation of a World War II submarine in the South Pacific.

All the submarine's critical battle stations have been reproduced - the engine room, ship's bridge and conning tower. Lifelike sound effects of the sea engine and submarine klaxon add to the reality.

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Stewart Bell, head of Microprose in the UK, said: "It's the tremendous graphics capability of the Amiga that makes it ideal for Microprose simulations, which are the most realistic in the market. We plan to release more titles for the Amiga in the future."

Precision Software has achieved great success in the US market with the Amiga Superbase Personal database. The package has reached number four in the American best seller chart.



Personal Superbase from Precision

Nigal Lovatt-Turner commented: "The demand for Superbase Personal on the Amiga has taken even us by surprise. We seem to have achieved a very high percentage of sales to existing users already so we are anticipating outstanding sales when the new Amigas start to sell in volume this year."

Superbase Personal is a database which has no limits on the number of fields or size of the record. As many

More from Domark

Keeping the impetus going in the Trivial Pursuits craze, Domark has announced the release of the Body Boomer edition on the C64.

The Baby Boomer edition contains questions in six new categories all connected with the post war baby boom era.

The Baby Boomer edition will be available as a complete game pack for £14.95, comprising the new question pack and the full game program. If you already have a Trivial Pursuit game pack then you need only buy the extra questions pack at £7.95.

Domark has also obtained the

computer game rights to this summer's new Bond film, The Living Daylights.

Licensed from the producers of the James Bond Film, the game closely follows the storyline of the film which is the first Bond movie to feature Timothy Dalton in the starring role.

Both the film and the game will be launched this summer, the C64 version will be out in mid-July.

Domark: Domark House, 22 Hartfield Road, London SW19 3TA. Tel: 01 947 5622.

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Silent Service from Microprose

files as needed can be opened up to build up a relational report.

The cost of Superbase Personal is £149.95 including VAT.

Touchline

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Microprose: 2 Market Place, Tetbury, Gloucestershire GL8 8DA. Tel: 0666 54326. Precision: 6 Park Terrace, Worcester Park, Surrey KT4 7JZ. Tel: 01 330 7166.



Gremlin has announced the imminent release of a follow up game to Things on a Spring. This old character has been brought out of the cupboard to. star in a new game entitled. Thing Bounces Back.

Having dealt with the Toy Goblin in his previous adventure, Thing must now set about stopping the toy factory automatically producing evil toys.

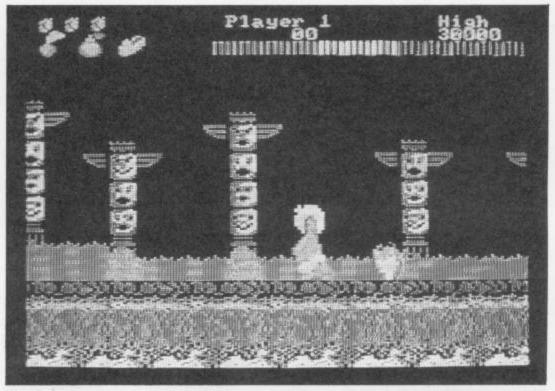
There are perils galore. Water rushes at him as he travels around the pipe network, surfaces explode under his spring and iron chickens aim alien filled eggs at his head.

The new game will be on the C64. Also for the C64 from Gremlin is Convoy Raider, a strategic war game in which you must patrol the coastline of the inner sea using modern weapon systems, including sea wolf missiles, excocets and an anti-submarine

The fate of the free world lies in your hands. Look out for this new title in May.

Touchline

Gremlin: Alpha House, 10 Carver Street, Sheffield S1 4FS. Tel: 0742 753423.



Wonderboy

Activision Action

The Electric Dreams arm of Activision has announced that it has gained the licence for Star Raiders II, a galactic adventure.

The future of the Atarian federation is in your hands as the evil Zylon master, Chut, plans to destroy the Celos IV star system. You must pilot the Liberty Star, in order to wipe out the Zylon Master force and its base.

The new game should be in the shops now and costs £9.99 on C64 cassette and £14.99 on disk.

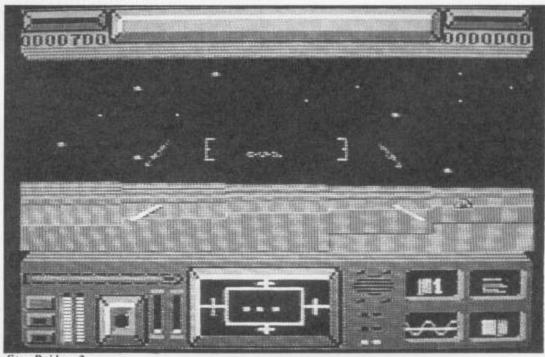
Also from Activision for the C64 is Wonderboy. Wonderboy is a hero in a

nappy. His quest is to reach his girlfriend, however there are numerous hazards littering the landscape to be crossed. Luckily he can break open eggs, collect an axe, a guardian angel and other useful items. A skateboard can speed things up and picking fruit can give you bonuses.

Wonderboy will be available in May at £9.99 on cassette and £14.99 on disk.

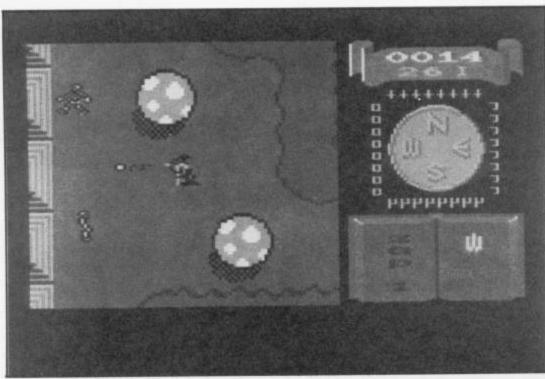
Touchline

Activision: 23 Pond Street, Hampstead, London NW3 2PN. Tel: 01 431 1101.



Star Raiders 2

YOUR COMMODORE june 1987



Wiz from Melbourne House

Arcadia

There are several arcade titles which have been released recently.

CRL has announced Traxxion for the C64, an arcade shoot 'em up planned for June. Traxxion is a construction site satellite orbiting Reema, one of the Tau Ceti planets. It is a flat, rectangular platform with a complex series of magnetic monorails on which maintenance cars drive. A slab of concrete covers this and maintenance cars drive beneath it. The . Your aim is to fill up your spell book

satellite has been damaged in a war and now the reactor has started to meltdown. You must find the exit from the monorail system before Traxxion is destroyed.

Wiz is a new game from Melbourne House featuring Midgard, a world almost entirely populated with magicians, sorcerers and wizards. You start as an apprentice who wants to become a fifth level King Wizard. and collect ingredients for magic rites. However, a parallel evil world keeps intruding upon you and you must face its population of grotesque misshapen

Wiz will be available in June on C64 disk at £14.95 and cassette at £9.95.

Martech has announced the imminent release of a new arcade adventure. Catch 23, for July this year. (C64 format).

Catch 23 is a Star Wars type program featuring the CK23, an orbital interceptor, belonging to an enemy power. It remains stationary in orbit until danger strikes, then it reenters the atmosphere to destroy missiles or aircraft with its sophisticated laser weaponry. LThe CK 23 is still located at its test site, a lonely deserted island, heavily guarded. You must steal the secret of the design of the CK 23 and then set off an explosion which will destroy the whole island.

It will be available for £8.95 on cassette and £12.95 on disk.

Touchline

CRL: 9 Kings Yard, Carpenters Road, London E15 2HD. Tel: 01 533 2918. Melbourne House: 60 High Street, Hampton Wick, Kingston-upon-Thames, Surrey KT1 4DB. Tel: 01 943 3911. Martech: Martech House, Bay Terrace, Pevensey Bay, E. Sussex. Tel: 0323 768456.

Utilities

System Software has recently made available Hack-Pack 64.

Hack-Pack 64 is a C64 utility pack containing a full feature Tooklit for Basic programmers, which places many new commands at their disposal to make Basic programming more effective.

The package contains the SSol Compressor which will reduce a program to its minimum size.

Included with Hack-Pack is the Ram Disk. Ram Disk allows the user to set up areas of the C64's Ram as a fast 'disk drive'. The price of the package is £24.95 inclusive.

Touchline

Systems Software: 16B Worcester Place, Oxford OX1 2JW. Tel: 0865 54195.

Adventure Line

Following the success of The Pawn, Firebird has just released another Magnetic Scrolls adventure - Guild of Thieves.

At the start of the game you must apply to the Guild of Thieves and tests will be set to prove your worth. The task you are given in the game will be set according to your original status.

The parser used in The Pawn will also form an integral part of Guild of Thieves and the whole game is set in the legendary land of Keovnia which will be familiar to Pawn players.

The C64 version consists of two disks and costs £19.95.

Lord of the Rings fans will be pleased to hear that the second part of the Lord of The Rings trilogy from Melbourne House will be available soon. Entitled Shadows of Mordor, the game closely follows the story line of the second part of the Lord of The Rings, The Two Towers, although the player can deviate from this and experiment with alternative strategy. Shadows of Mordor also feature Inglish, the language specially developed to make input easier. The computer can understand virtually any sentence up to 128 characters long and has 800 words in its vocabulary.

The game will be available at the end of June 1987 on C64 disk for £14.95.

Touchline

Rainbird: First Floor, 74 New Oxford Street, London WC1A 1PS. Tel: 01 240 8838. Melbourne House: 60 High Street, Hampton Wick, Kingston Upon Thames, Surrey KT1 4DB. Tel: 01 943 3911.

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Far the thre

Warlocks and Warlocks and Wargames

American software house, SSI, has recently launched a new offensive in this country, with an impressive selection of strategy games. Here, we look at just a few of them.

By Tony Hetherington

Computer strategy games have yet to achieve the success they deserve with only a handful of companies producing quality wargames. Now, an American company, SSI, promises to unlock your imagination with its own style of strategy games.

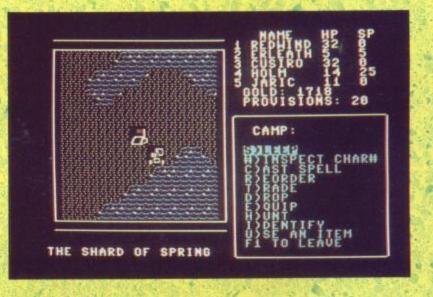
SSI stands for the California based Strategic Simulations Inc. which has a mammouth catalogue of war, fantasy and science fiction games that are now being imported through US Gold. Some SSI games have already travelled across the pond and titles such as *Knights in the Desert, Vietnam* and *Germany 1985* have all received impressive reviews. SSI's latest catalogue contains over 50 C64 simulations, the following games are just the tip of the iceberg.

This month's game of the month, Colonial Conquests, is one of the latest batch of imports that also contains the fantasy games Gemstone Warrior, Shard of Spring and Ring of Zilfin; the science fiction battle for survival in Roadwar 2000 and war between galleons in Broadsides: Hitler's elite infantry in Panzer Grenadiers and modern forces in Mech Brigade. The standard and complexity of the games vary considerably from the easy-to-play Colonial Conquest to the complexity of Mech Brigade that even includes a listing to type in to help you play the game!

Whatever the game they are all supplied with full instructions and even the odd hint sheet to get you going. Most feature full joystick controls to let you concentrate on the tactics of success.

Fantasy Games

Fantasy roleplaying games have enjoyed enormous success, the best being the Ultima series but now SS1 has released three totally different approaches to this intriguing format.



Shard of Spring

The Shard, a fragment of the enchantent stone, worked its magic on the island of Ymros for thousands of years maintaining a blissful climate by shutting out the storms of winter. Now this has been stolen by an evil sorceress who has ransomed the land into abject poverty. Your quest is to raise a party of human, elf, dwarf, troll and gnome wizards and warriors to free the land from this tyranny.

Before you begin your quest you must build a party of five brave heroes by selecting the character utilities included on the game disk. Each character can be any of the five races and their strength, intelligence, speed, intellect, endurance and skill is decided at random. These can be selected a maximum of three time to increase your chances and are adjusted depending on the race of your character. For example trolls are strong and tough critters but aren't renowned for their speed or intelligence. Next you assign a

class which can only be warrior or wizard and then finally

The skills set this game apart from any other as you can tailor your party to fit your needs. Warriors can be given weapon skills, karate, beserking or hunting (finds food for the party) and wizards can learn the spells of the fire, wind, ice and spirit runes as well as learn weapon, potion, monster and item lore or even the divine art of priesthood.

These skills are invaluable to your quest as a wizard with weapon and item lore can identify objects that you find (otherwise you can't use them), priests can dispell the undead monsters and the rune classes decide the spells you can cast.

The first stage of your quest is survival particularly when you're attacked by zombies, skeletons, giant snakes and spiders as well as other wizards and warriors! During combat the normal screen display, which shows a single character moving over the terrain, expands to show the whole party and the creatures they are fighting. Now your speed is the crucial factor as this decides the number of movement points the character gets each battle turn. These are vital as it costs two movement points to move but also three for every attack you make! So fighters with high speed and strength factors get several damaging attacks in every round.

The wizards can join in the fighting, or can help by easting spells such as fire storm, hail storm and tempest that delivers damage to an area (hopefully containing all the monsters and no party), armour and ice shield protection spells and healing spells to patch up the fighters after the battle.

The spells cost a varying number of spell points (a wizard is assigned sell points depending on his intelligence) that add clout to the damage spells and power to the protection. The spell points can be regained by resting and should be used wisely as a well timed spell can save the day.

As your party fights its way through the wilderness, dungeons, towns and ruins of the land, they will gain gold to buy equipment and food and experience points with which they can progress through the levels until finally they have enough strength, weaponry and spell power to defeat the sorceress.



Rings of Zilfin

You're on your own in this fully animated adventure in which you must race to find the second ring of Zilfin before

the evil Lord Dragos gains the pair of them and supernatural powers. You play Reis, a wizard warrior of Batiniq, who must grow in strength and power as the quest unfolds.

The playing time for the game is estimated at between 30

to 40 hours so be prepared to go slowly.

Dragos' castle lies to the north but before you go there you have a lot to do. You must collect the magic mushrooms from the side of the road that will heal your wounds, protect you from poison and aid your combat. You must fight the goblins, trolls, shape shifters and other monsters that pollute the land to earn gold and experience. Trade with the villagers to gain the weapons you need and talk to the locals to learn the legends and rumours.

The game is entirely animated by tiny characters that play out the story. When you enter a town or encounter a monster the screen expands and uses windows to pile as

much atmopshere into the game as possible.

I found the game to be overly complex and reliant on unusual concepts such as the constant need to collect mushrooms and the weird and wonderful spell names such as Buzzap, Ekbert, Jazzip and Zytrom. I prefered the more classical style of role playing found in the Shard of Spring. The Rings of Zilfin is the bigger and more detailed game packed full of rumours and intrigue but is for a solo adventurer which, for me, lacked the excitement of guiding a party.



Gemstone Warrior

Gemstone Warrior is the closest SSI gets to an areade game as our joystick controlled hero searches the caverns of horror for the five pieces of the powerful gemstone. Our sword slaying, arrow firing, fireball blazing hero explores the caverns through archways, doors and grates to do battle with skeletons, ghosts, demons, giant amoebae and exploding gas plants to plunder treasure and glory.

Just because it looks like an arcade game doesn't mean it isn't packed full of strategy. Certain monsters carry specific magical and useful items. Knowing what to kill when, could save your life. The objects you find by opening chests and coffins all have a use. Goblets (heal), wands (freeze), rings (invisibility) and scrolls (illusion) all have documented uses but what about the ornate daggers, flowers and dice? How you use the objects and which weapons you use against the various adventurers chomping monsters could lead you to a successful quest or an untimely end.

These factors add the expected depth to an all action arcade adventure that makes a refreshing break from the

mind boggling simulations:

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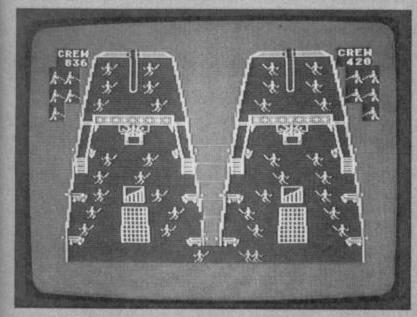
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Wargames

Wargames simulations are the bread and butter programs of SSI's catalogue but contain an incredible variation of conflict and combatants. The following games highlight this variety of not only game type and style but also complexity from games that take 15 to 20 minutes to play to those requiring 10 hours of constant concentration.



Broadsides

Swashbuckling action on the high seas is the name of the game as great galleons meet in conflict between rival captains and their crew.

The main screen shows both ships as they approach each other with crew, orders, ship damage and speed displays on the left.

The two captains enter their commands through joystick control which orders the ship to turn to the port or starboard, aim at the hull or sails, increase or decrease speed and fire. In the advanced game you can also select sails, to fire grape shot or cannon and even design your galleon from scratch.

Later once the cannons have taken their toll on the ships and their rigging they will close and the boarding parties will battle with sabres as the snipers menace with muskets.



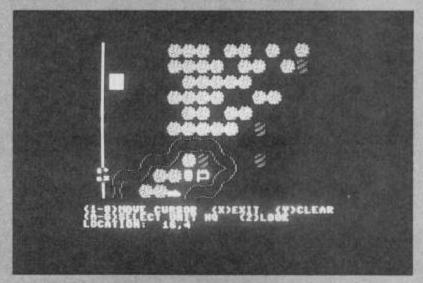
Panzer Grenadier

The problem with infantry is that they're essential when actually taking the territory of a battleground but they can't

keep up with the trailblazing battle tanks. The Panzer Grenadiers changed all that as they were soldiers riding halftracks, trucks and armoured cars and rapidly became Hitler's elite force. In *Panzer Grenadier* you control this force in a series of scenarios on the eastern front in which you must take and hold crucial bridges and break up Russian counterattacks.

The game looks like the product of the authors' Wargame Construction Set (also in the first batch of imports) which is the wargame equivalent of the Quill. Thirty one units on either side can be fully set up to fight as wizards, tanks or starships on a definable scrolling map. In this game the units are the troops, mortars, machine guns, motorcycles and tanks of the grenadiers and their opponents.

I found the unit counters to be a little too small for comfort and as a result I would recommend you get the construction set and build your own scenarios.



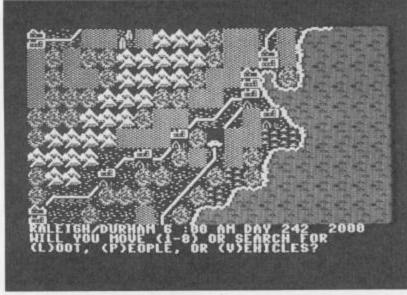
Mech Brigade

There are only a few computer wargames that actually need a computer other than to provide an opponent. Mech Brigade is one of them. Although you control units representing the tanks, artillery, helicopters and armoured vehicle of modern warfare the computer stores and uses the ratings of front and back armour, size, speed, number of guns, gun range, gun penetration, gun accuracy, shell size and missiles carried for each and every vehicle.

The game simulates war between East and West in the 1990's and pits Nato Apache AH-64 helicopters, Bradley and Abrahams tanks against Hind helicopters T-72 tanks and ZSU23 self propelled guns. Don't be surprised if these units sound familiar as the Apache helicopter is better known as the Gunship and the other units are the ones you meet in the Western europe scenario.

Mech Brigade is undoubtedly a complicated game and deserves its advanced label and three hour playing time but, despite this, it is still remarkably playable. Single letter commands are used to issue orders to your units in the games four scenarios or in a scenario you have built yourself. One of the most useful commands, surprisingly not found in other wargames, is the view command that highlights the area in a specified units line of sight. This is crucial to deciding combat tactics and is incredibly annoying in other games when your attacks are disallowed for a surprising "no line of sight" decision. Now there are no doubts.

The combination of tanks, guns, infantry, guided missiles and of course helicopters make this a fascinating and challenging game.



Roadwar 2000

Roadwar 2000 presents the challenge of a battle of survival in a disease and nuclear devastated America. Suicide squads from an unknown enemy infected the nation with a deadly virus that then mutated when the Russians launched nuclear strikes.

Now the country is run by feudal gangs led by fanatics like you.

Your job as gang leader is to build up your rabble from

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fighting force in the west.

You'll have to loot cities and farmland for food, medicines and supplies, search for useable vehicles such as sports cars, trucks and motorbikes, and recruit new gang members to swell your ranks while battling with other gangs, mobs and the dreaded infected mutants. Gradually, your gang will improve in number and quality, ride better vehicles, armed with metal found in foundaries and one day may be strong enough to take cities such as New York.

More to Come . . .

That's just the tip of the iceberg as SSI games are set to swamp the strategy scene with American Football, Baseball, golf and boxing sports simulations, The Cosmic Battle and Imperium Galactum for science fiction freaks, Gemstone Healer, Wizard's Crown and the Phantasie trilogy for fantasy fans and wargames covering all fields of battle from the past to the present and into the future.

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It's difficult to pick out any favourites from this group of excellent and varied games but two stand out head and shoulders above the rest for pure and simple playability. They are Colonial Conquests and Shard of Spring.

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Letters

Your Commodore readers take the floor to air views, information and, of course, complaints.

Software Services

I live in Belgium and I would like to buy some of the programs on tape and disk which have been published in your magazine.

However, I don't know the prices for Belgium, Can you advise me on this and also on the form of payment? Buchet Morc, Namur, Belgium.

Living in Australia and being an avid reader of Your Commodore. I would like to know if there is any possibility of purchasing one of the Your Commodore software tapes. Please could you advise me if this is possible and also let me know the costs? Neil McKinnon, Victoria, Australia.

Our Software Service is, of course, open to all overseas readers with an extra charge of £1 sterling for overseas postage. Payment can be made using either an international money order or a cheque made out in pounds sterling. Please use the official order form published every month on the Software

for Sale page. We would also like to remind our readers that all our tapes are still available dating back to March 1986 when the service was launched.

Diskit

This letter gives me the opportunity to thank the editor for the long chat which I had with him at the last Commodore Show and to compliment Your Commodore on the fact that the magazine has not only maintained its high standard but gone from strength to strength. In this country, it's in a class of its own.

However, my immediate problem is that one of the articles in my copy of March 1987, is partially unreadable. The article was Diskits 1,2 and 3 and I was wondering if it would be possible to obtain a legible copy.

If I may also make a suggestion for future content of the magazine, perhaps there is scope for the occasional hardware article e.g build your own cartridge?

Thank you again and may you (and contributors), keep up the good work. Mike Ventham, Radlett.

We apologise for the bad quality of the printing in the Diskit article. This was due to a complicated set of circumstances which wouldn't normally arise. Anyone who is very keen to use this article, should write to us at the editorial address (you will find it inside the back of the magazine) and we will send a clean set of photocopies free of

With regard to hardware articles, we would be quite happy to publish this type of feature, but it is very difficult fo find someone who has the right type of knowledge and reliability. Until we find the right person, we're reluctant to experiment.

Education Crisis

Can you help me please? My children, aged five and seven, now have a C64. The problem is that we are struggling to find suitable games for them.

We are looking for educational adventure games similar to the Nursery Rhyme Land game which appeared recently in Your Commodore (February and March 87). The shops only seem to stock the most popular games and we have a few of these. But we are not yet at the stage where we can devise our own.

So I would be grateful if you could supply me with any information.

Mrs.D.A. Summers, Bristol.

As you have quite rightly realised, Mrs. Summers, educational software is very thin on the ground at the moment, however there are a few companies who deal in this market who may be able to supply you with what you need.

Collins Soft: 7 Grafton Street, London W1X 3LA. Tel: 01493 7070.

Longmans: Longman House, Burnt Mull, Harlow, Essex CM20 2.IE. Tel: 0279 26721.

US Gold Kids!: Units 2/3, Holford Way, Holford, Birmingham B6 7AX. Tel: 021 356 3388.

School Software: 69 Meadowvale, Raheen, Limerick, Eire. Tel: 061 27994. Data Quest: 92 Bisopswater, Wexford,

Two Small Problems

As a C64 user, I have come up against one or two problems which I hope you can help me solve.

My Basic data converter has broken down. Is there a program which could convert my data to Basic?

I would also like to know if there are any C64 user groups and if so how can I get in contact with them?

L.V. Wigmore, Epping

We published a program which would suit your needs in the April 1987 issue of Your Commodore. The best user group to contact is ICPUG. Write to: Jack B. Cohen, Membership Secretary, 30 Brancaster Road, Newbury Park, Ilford, Essex IG2 7EP. One year's subscription is £10.

At the editorial office we receive hundreds of letters from readers every month. We do try and answer each individually but sometimes this is impossible due to pressure of work. If you have written to us and not received an answer, we apologise for this but we cannot promise to reply to every piece of mail we receive. If you feel that your question or letter really needs an answer, then inclusion of an s.a.e. will guarantee a reply, although this may still take time in arriving.

The Professor

Novices take heart. This new package from Precision Software will introduce you gently to computing and help you conquer all your phobias.

By S. Garton

robably many of you reading this review will say "who needs such things?". I for one found it very useful. We can't all be as bright or computerised as you lot, even you had to start somewhere. The package I am talking about is The Professor, a selftutorial for the C64. It covers an introduction to Basic programming and sections on sound and graphics to show you what your C64 is capable of.

Documentation

The thing I particularly liked about The Professor is that you don't have to plough through reams and reams of paper to follow it as most of the" instructions and explanations are included on the disk. There is a very small booklet of about 10 pages which basically tells you how to load the programs and how to experiment with the sound and graphics sections.

Starting Up

On the first side of the disk you can choose from the keyboard or Basic. Being a little stupid as far as computers are concerned I decided to start right at the beginning with the keyboard. The program explains the labelling of the keys and what each can be used for. The Professor is very good in that you work at your own pace, you don't have to rush and read something before it

As you work through the keyboard section you have to press different keys to continue which is good because it gets you used to handling the keyboard. This may seem very basic to some but if you haven't handled a computer before it can get you over the

'scared of touching it in case I do something wrong' syndrome.

The second section on the first side of the disk is called Basic. It goes into many things including using drives and cassettes and using different commands such as FOR and NEXT loops and PEEK and POKE, I was a little disappointed with this section as I felt that once I had completed it and fully understood it I would be a bit nearer to being able to write my own program (even if only a very small useless one). However, though the program went through all the sections carefully it didn't allow you to experiment and try the commands out for yourself.

I think you can learn and understand things a lot easier through trial and error once you have the basic information needed. There was an example given in this section for formatting a disk. It was explained what this meant and why it was necessary but the commands it used weren't explained. I felt it would have been useful to understand what 1,8 and OPEN and CLOSE meant since it would make more sense when you typed it in. Otherwise it becomes the jumble of a foreign language.

In one sense the disk is very basic, aiming at real beginners but then puts confusing or complicated statements which you were expected to understand. For instance in explaining how to validate disks you are told that this shouldn't be done on disks containing relative files but it doesn't say what these are.

Sound and Graphics

The second side of the disk covers the aspects of sound and graphics

available on the C64. The first section COMMO was a bit like a music lesson. Explaining the different kinds of waveforms used by the computer.

Following this was a test to see if you had understood the sounds (you need to have quite a good musical ear to get 100%). You have an opportunity to load a sound generator example and I liked the fact that you play around with this and make your own sounds. You need the manual for this which explains how to change the oscillators and waveforms etc. for different effects. The instructions were quite difficult to start with and if you're not careful you find your eardrums being blasted with a noise that you can't

Conclusion

All in all I found this package quite useful but felt the first side could have been extended a little further to give a wider knowledge of Basic programming. The second side was very good but didn't indicate how all these sounds and graphics could be used outside this disk. The disk as a whole seemed to be aiming at two different levels of computing knowledge. I think it might be useful to people who have so far only used their computers for playing games and have decided to see what else they can do with it.

Touchline

Name: The Professor. Price: £11.95. Machine: C64+disk. Supplier: Precision Software, 6 Park Terrace, Worcester Park, London KT 7JZ. Tel: 01 330 7166.

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Blazing Paddles

Datel Electronics has recently imported this impressive illustrator package from the States. We take a look at what it can do.

By Evelyn Mills

Sophisticated graphics program for the C64 which is powerful, well designed and easy to use. It should be particularly noted that this program provides printer output to the Commodore 1525, MPS 801, Epson 0 and 100 Series, the Gemini 10 and Gemini 100 plus interface adaptors, while graphics may be handled with touch tablet, joystick, paddles, trackerball or lightpen. Too often one or many of these features are lacking in graphics software, but you will not be disappointed here.

Initially there is a Main Menu which is pleasantly displayed around the screen providing the following options.

Doodling

Sketching option is as the name implies and there are seven different thicknesses of line including transverse, horizontal and vertical; as well as free-hand drawing, lines and linked lines. Screen colour is changed with F1 and border colour with F3. The colour of the 'pen' is controlled by an option which pulls down a screen of the full 16 Commodore colours. To add to this there is a on/off colour mixer icon allowing for pattern filled drawing. Filling is, of course, available in either normal or pattern mode.

The BOX and OVAL options are smoothly handled (no staggers here!) either in the 'empty' state or as solid figures, should a mistake be made, the last part of the drawing entered can be removed with the space-bar. If you are totally displeased with the lot, throw it in the 'dustbin' icon and clear and screen. My only criticism is that there is no control over the speed of joystick manipulation. My lightpen, however

behaves most satisfactorily with this software.

The Main Menu also has DOTTING and SPRAY features which incorporate well into your drawings – the latter is really effective. Going to the ZOOM option allows for careful, fine alterations to any part of your drawing as per usual.

The WINDOW icon presents another screen for Cutting and Pasting. If you choose cutting, select a minute part of a large area of your drawing and place it on another part of the screen (remove it with the spacebar if it's not suitable and try again). The Pasting option is very good. Here the screen may be cleared, a different drawing loaded from disk to screen, and the part you have cut out from the first drawing may then be pasted to

any area on the new picture – in other words, it all stays in memory and there is no need to involve interim switching on and off of the computer. If you wish, however, windows can be saved and loaded to and from disk – as can your graphics, partly or fully completed.

Disk options

Now select the DISK option from the Main Menu to give the DISK UTILITY MENU. Here are the facilities for saving and loading to disk, plus a disk catalogue and a disk management system. If you select the latter, disk formatting, erasure and renaming are available. There are also two other features on the Utility Menu.

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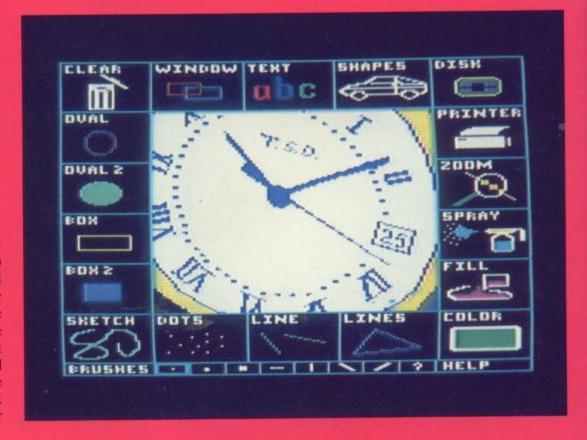
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Mini Office II



WORD PROCESSOR

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Compose a letter, set the printout options using embedded commands or menus, use the mail merge facility to produce personalised circulars – and more!

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YCM6

Table option, you have access to 'inbuilt' drawings for you to add to your graphics if you so wish. These are classified as miscellaneous, plants, transport, face parts, animals and weapons. There is quite an arsenal in the whole lot varying from trees to ears, to kangaroos to 'planes, trucks boats and things. Select your option, go back to the Main Menu then to the Shape icon and rummage through the lot. The drawings can be flapped and rotated and placed on screen in any position. It should be emphasised that these are not sprites but drawings and will therefore output to the printer.

The Load Character set option, provides four styles of print for captions: standard, bold, script and italic. Having made your selection, off to the Main Menu, select the ABC icon and scribe away using the keyboard lettering in both upper and lower case.

The Printer icon leads to selective printer output which is self explanatory.

To Sum Up

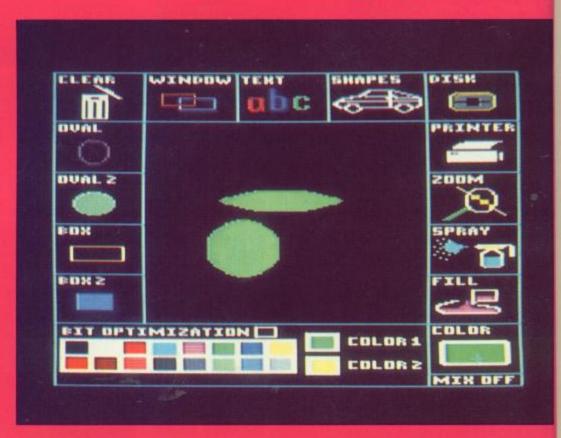
Quite apart from the inbuilt drawings, you have here a very professional tool for your money (£24.99). Everything works well, with the minimum of fuss and little chance of crashing. With patience and care a great deal can be achieved graphically; the programmers have done a good job so the rest is up to you! Incidentally, try loading a picture if you want a look-see at the authors. There is also a world map there.

Fundamentally you pay for what you get and, in my opinion, Blazing Paddles is worth the price.



Touchline
Name: Blazing paddles.
Supplier: Datel Electronics, Units
8/9, Fenton Industrial Estate.

Dewsbury Road, Fenton, Stoke-on-Trent. **Tel**: 0782 273815. **Price**: £24.99 post free. State Tape or disk including free light pen.



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Accelerator +

Want a drive for your Commodore computer? Can't afford a 1541? perhaps the Accelerator + is for you.

By Stuart Cooke

One of the many gripes that people have about Commodore equipment is the fact that, without complicated interfacing, only other Commodore product s work with it. In the USA a number of manufacturers have made the most out of this by producing a Commodore compatible products, new disk drives being one of the most popular. Now Evesham has introduced an alternative Commodore compatible drive on to the UK market.

Good Looks

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e or disk

rice:

It is extremely difficult to comment on a disk drive since it simply works or it doesn't. Accelerator + works and it works extremely well offering a number of advantages over its Commodore counterparts.

The size of the drive is roughly half that of the drives from Commodore. This has been achieved by placing the power supply outside the disk drive casing, just like your computer's powerpack. This is great for people who require a two drive system since two drives no longer take up your work desk, they can sit neatly on top of each other taking up less room than a single Commodore drive.

Snail Pace?

Commodore disk drives are so slow when compared to many other computers and drives on sale that a number of manufacturers have produced add-ons to speed up operation of the drives, Dolphin Dos again from Evesham being extremely popular, a speed increase of 25% is claimed for the Accelerator +. This may not seem like a great amount at first but, when you are loading large files, a 25% increase in speed is worth having. To be fair to the Commodore

drives, I did find the increase in speed to be of notice only on large files, on smaller ones you simply don't notice the difference.

Compatibility

One of the major problems with Commodore disk drives is one of compatibility. Many programs are using forms of protection that will only work on the 1541 drive and will not work on either the 1570 or 1571 drives that are available. Best known offender is Elite from Firebird. It is impossible to LOAD this on anything apart from a 1541. With the Accelerator + Elite was the only program that I could find that wouldn't LOAD. This isn't bad when it doesn't even work on all Commodore's drives.

Commands Available

All of the commands that you can use on the Commodore range of drives are present. The detailed manual explains them all for those of you that have never used a disk drive before. Because all the standard commands are available I found that all the disk-orientated utility programs that I have, such as a disk monitor, all work without any problems at all.

What Device

If you have ever used more than one Commodore drive together you probably know how difficult it is to change the device number on one. Two options are available to you, you can either choose the software option of altering the number of the drive through a number of commands every time that you turn your drive on, or you can unscrew your case and cut a track on the circuit board making the

alteration permanent. With Accelerator + things are much easier. Turning the drive over reveals two small switches. To change the device number of the drive simply move the switches to the relevant position and you've done it.

In Use

Using the drive presents no problems. The drive appears to be much quieter than the 1541 drive in operation which will please people who are fed up with the sound of their 1541 disk head moving around.

I could only find one real fault with the drive, and to be honest the fault was caused by my error. If you have ever used a Commodore drive then you will no doubt know that on many models the disk is pushed out of the drive when you open the drive door. With the Accelerator + this is not the case. If, like me, you have the drive below the level of the computer this makes it difficult to see if a disk is in the drive. On a couple of occasions I found that I couldn't use a disk only to find the reason this was caused was because there was already one in the drive.

Verdict

The Accelerator + is an excellent product. The fact that it takes up a lot less space than a Commodore drive and that it is almost completely compatible with the 1541 would win me over to it even without the advantage of the speed increase.

To quote Evesham: "Why buy a lumbering hippo (1541) when you can buy an *Accelerator* + for forty pounds less!" Why indeed?

Touchline

Name: Accelerator +. Supplier: Evesham Micros, 63 Bridge Street, Evesham, Worcs WR11 4SF. Tel: 0386 41989. Price: £159.95.

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Fitting involves the insertion of two sub assembly circuit boards, one in the 1541 and one in the '64/'128. These normally just plug in but on some '64s a small amount of soldering is necessary

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THESE ARE THE FACTS (not outrageous advertising claims)

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TAPE to TAPE DISC to TAPE

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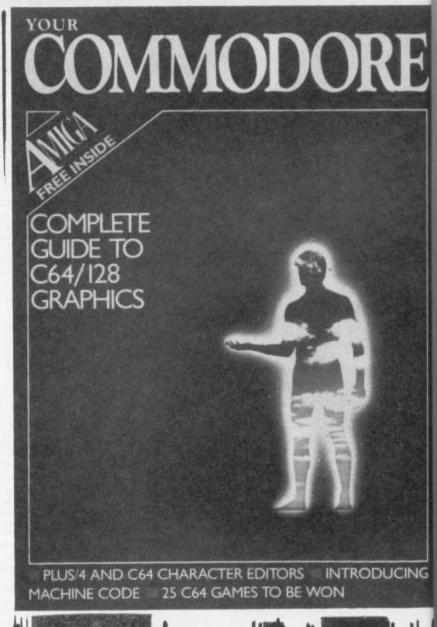
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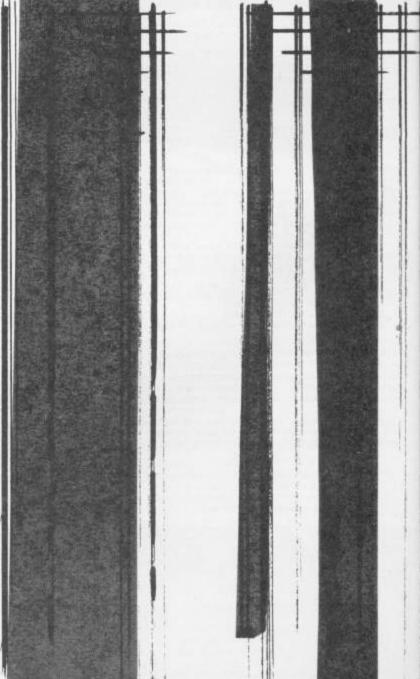
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RE

Games Reviews

Arcade games galore will keep you entertained. Take your pick from these pages.

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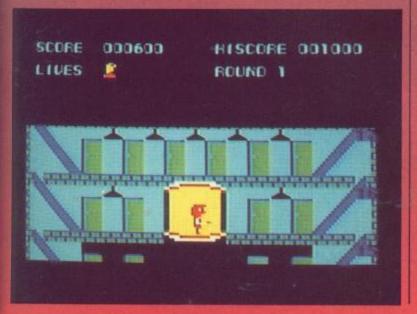
ELEVATOR ACTION

At long last, your search is over. You have found the secret hideout of the gang. All that remains for you to do now is search the building, discover all the secret plans and make good your escape. What could be easier?

Elevator Action is a conversion of the Arcade game from

Elevator Action is a conversion of the Arcade game from Taito. Starting at the top of the building, you must use the lifts and stairs to take you to the various floors. Doors containing part of the plans conveniently flash, indicating their whereabouts and these must be searched.

Intent on hindering your progress are a multitude of gangsters who appear out of the other rooms, shooting as they go. Fortunately, the bullets travel slowly enough for you to leap. You can of course fire back or, if you are close enough, deliver a deadly karate kick. It is also possible to shoot out the lights thus throwing everything into a state of confusion. When you have obtained all the plans, make your way to the bottom of the building where your getaway car is waiting.



The getaway is soemthing of a misnomer though as you only travel to the roof of the next building where the baddies are correspondingly tougher.

The gameplay in Elevator Action is at best tedious, the graphics are crude and there are several bugs – the game crashes, your man keeps flying off the top of the screen etc. What more can I say apart from don't waste your money.

G.R.H

Touchline

Title: Elevator Action. Machine: C64. Supplier: Quicksilva, Victory House, Leicester Place, London WC2H 7NB. Tel: 01 439 0666.

Originality: 4/10. Graphics: 4/10. Playability: 3/10. Value: 2/10.

SAILING

ow that the Americas Cup has been won by America (again) you'd think that we could go back to ignoring sailing. No chance! Once the software houses have discovered a new sport we're going to get swamped in games. Luckily, Activision's Sailing doesn't assume you're part of the plimsole and hat brigade and is an arcade players guide to sailing.

The game casts you as the challenger representing one of 18 countries in a ladder competition. You begin at the bottom of the ladder and by racing, and beating, yachts up to two places higher than you, you hope to climb the ladder to glory.

You're supposed to make decisions about your boat design and define factors such as the boat length, waterline length, mast height and keel design but I found that trial and error worked quite well and after the latest weather forecast I was ready for the first race.

During the races a split screen display shows a 3D view



ahead (including your opponent if he's ahead of you) and also your bank of instruments, including a wind direction marker and a radar that plots your progress around the course.

Winning a race not only depends on the design of your boat but also when you use your giant spinaker sail and the direction you sail in. Since the course is triangular you will have to sail both into the wind and with it, so you have to be careful when to use the sail (speeds you up when the wind is behind you) and to keep on course.

The result is a highly playable sailing game that allows you to compete alongside million dollar yachts for only £9.95.

Touchline

Title: Sailing. Supplier: Activision, 23 Pond Street, London NW3 2PN. Tel: 01 431 1101.

Machine: C64. Price: £9.95 (cass) £14.94 (disk).

Originality: 6/10. Playability: 7/10. Graphics: 7/10. Value:

n an unknown time, the mothership Arkanoid was destroyed. There were no survivors apart from yourself who managed to escape in the spacecraft Vaus. Not to complete safety though as you become trapped in the void. If you can penetrate 32 levels though and overcome a final confrontation with the Dimension Changer, time itself will be reversed and Arkanoid will be resurrected.

Right, hands up all of you who guessed from the opening paragraph that the game being described was none other than that old favourite, Breakout. OK, so this version is somewhat more sophisticated than the original but the game remains the same.

Converted from the arcade game of the same na,e the object is to bounce a ball into a brick wall, thus knocking bricks out of it. When the last brick vanishes, you progress on to the next level. Of course, it's not quite that easy. Some of the bricks have to be hit several times before they finally yield. This is especially difficult on the higher levels with five hits per brick being required. Some bricks are totally indestructable and are just there to futher hinder you. As too are the monsters that materialise. These have no function in the game save that they deflect the ball from its original path.

So much for the bad news. Not everything is against yo however. Hiit certain bricks and capsules are release towards you. Catch one of these on your bat and you ga the benefit for as long as you keep the ball in play or until yo capture another capsule. There are three main types bonus.

Those that help you hit and aim the ball - extended be length, slowing down of the ball and catching the ball on the bat. Those that help you destroy the bricks - a laser and the ball splitting into three and finally, the long term benefits an extra life and a passage through to the next level.

The graphics are reasonable if not startling and for tho of you whom ability prevents from getting very far, there is bug that you might find useful. On our review copy, w found that when player two got his first bonus life at 20.00 points, we went into an infinite life mode.

This game is direct competition with Krakout from Gremlin and the office was split down the middle as to which it preferred. Krakout offers more player options and furth style go sixty-eight screens. Arkanoid is mroe difficult. Personally, knives prefer Krakout but our illustrious editor has somewh glyphs diametrically opposite views. You pays your money and yo you the takes your choice.

Touchline

Title: Arkanoid. Machine: C64. Supplier: Imagine, Units 2/ Holford Way. Holford, Birmingham B6 7AX. Tel: 021 35

Originality: 4/10. Graphics: 6/10. Playability: 7/10. Value



RANARAMA

ervyn the Sorcerer's Apprentice was attempting concoct a spell to improve his looks and turned himself in a frog! Now evil Warlocks have him trapped in a dunger but at least he's still alive. Your job in Steve Turner's fir C64 game is to defeat the Warlocks and restore yourself humanity

You begin the game in a room on the first level of the dungeon with eight Warlocks to track down. These at the guarded by evil critters such as dwarves, fire gollums, ghou Oth and serpents that attack you on sight. Unfortunately, youg

You begin the game with the lowest spells in each of th you find a door to enter into them. Even if you've alread been in them their contents remain cloaked until too late also

G.R.I glyph

Yo to fine Warlo Th

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it level of the n. These are llums, ghouls ately, you get in each of the ou've already ntil too late.



As well as the nasties the rooms also contain Gauntlet style generators that produce munching mouths, spinning knives and orbiters to sap your strength and mysterious glyphs set into the floor. Each glyph has a specific use to help you through the game and so should be used sparingly. The glyph of seeing displays a map of the level (only the rooms you've already explored), the glyph of power wipes out some of the critters in the room, travel leads you down to the other levels and Sorcery is used to improve your spells.

You begin the game with the lowest spells in each of offensive, defensive, power (energy) and effect which is used to find secret doors. As you collect runes by defeating the Warlocks in magical combat you can get bigger and better spells to allow you to delve deeper into the dungeons.

The magical combat is a subgame that you play once you've cornered a Warlock (they can usually be spotted fleeing from the room) and consists of unjumbling an anagram of the word Ranarama by swapping pairs of letters. Complete it in the time limit and you can collect up to eight runes, lose and you lose the game.

Steve Turner is better known for his excellent Spectrum games as you'll find out once you play Ranarama as it looks and plays like a top Spectrum game. However it doesn't make use of the C64's superior sprite, and colour facilities which would have made an excellent game even better.

T.H

Touchline

Title: Ranarama. Supplier: Hewson, 56B Milton Trading Estate, Milton, Abingdon, Oxon OX14 4RX, Machine: C64. Originality:9/10. Playability: 7/10. Graphics: 3/10. Value: 7/10.

AFTERMATH

Looking like a coin-op conversion the Aftermath is the desperate struggle for survival following the victory by the Saurans. Now there seems to be little hope of survival unless you can fight through to the Strategic Command Centre past the dreaded discs of death and the impenetrable Veloscraft. Others have tried and failed you must succeed.

The object of the game is to fight your way through to the base by surviving 10 waves of aliens that attack in different ways. These can be shot with your laser bolts and you can also earn extra points by bombing buildings. These are

destroyed by lining up the sight that constantly travels in front of you with the target and pulling back on the joystick. Unfortunately, moving the ship to line up the sight on a target can move you into the path of an enemy missile that you thought was safely behind you.

The first aliens to strike are rotating discs that are then followed by space ships that move slowly down the screen destroying all in their path then the same ships appear, moving at an angle designed to catch the unwary gamer.

In later levels the bombing practice becomes essential as some of the buildings now fire at you as well!

A cheap and cheerful arcade game to fill in those odd moments between more challenging games.

Touchline

Title: Aftermath. Supplier: The Power House, CRL House, 9 King's Yard, Carpenters Road, London E15 2HD. Tel: 01 985 6877, Machine: C64. Price: £1.99.

Originality: 4/10. Playability: 7/10. Graphics: 5/10. Value: 7/10.



STRANGELOOP

The aliens are threatening Earth again, this time by taking over the major robot making factory and reprogramming the robots to form deadly weapons to destroy mankind. As usual you are Earth's last chance.

If it sounds like an old plot you'd be right because it's a budget rerelease of Virgin's first arcade adventure.

Your mission is to battle your way through 250 rooms to the control room. However, on the way, you will have to ensure you have sufficient oxygen supplies and keep your space suit patched up despite the almost constant bombardment of sharp swarf. These you can blast with your laser but your laser rifle has only 99 charges.

You can move from screen to screen either through the hatches at either side of the screen or by sliding up and down tubes that seem to lead everywhere but where you want to

A map at the bottom of the screen leads you to the control room but also into megaswarf areas so you need to know where extra oxygen cylinders, first aid kits and patches are stored.

To add to your problems you will also have to look out for pools of acid, conveyor belts, that carry you to your doom, and heavy traps poised to plummet as soon as you reach for the first aid box.



If you missed this one the first time round and enjoy 250 screen arcade adventures then snap up this budget game for your collection.

Touchline

Title: Strangeloop. Supplier: Bug-Byte. Victory House. Leicester Place, London WC2H 7NB, Tel: 439 0666. Machine: C64. Price: £2.99

Originality: 4/10. Playability: 6/10. Graphics: 5/10. Value: 5/10.

here's no plot or pseudo science fiction storyline in Pod it's just an incredibly addictive all action areade shoot-em-

You are the pod that must patrol a grid against alien attack by blasting them with your laser in a game that's a cross between Minter's Gridrunner-and coin-op's Centipede and Galaxians.

Everytime you zap an alient it explodes destroying part of the grid. And since you can only move along the fibres of a grid you can easily blast your way into trouble! Similarly if they get you, the resulting explosion takes out half the grid. Luckily it rebuilds itself so you might be able to hang on till the end of the attack wave.

You don't have to kill everything just survive for the time limit that counts down at the top of the screen. Survive and you'll win a bonus and an extra life to challenge the next level.



Bonus levels appear every fourth screen so you can pil

them and in some they set out to hunt you down. For thes you'll probably need the maximum five lives.

A fun, cheap, addictive arcade game. What more do yo

Touchline

Title: Pod. Supplier: Mastertronic, 8-10 Paul St. Londo EC2A 4JH. Fel: 01 377 6880. Machine: C64. Price: £1.99. Originality: 3/10. Playability: 10/10. Graphics: 4/10. Value

olve and evolve is the name of the game in this fu

You begin the game in nappies standing in the middle a wood until you are set upon by green catapillars and gia



By timing your leaps and shooting what can only described as goo that comes from just above the nappy yo should be able to buttle across the scrolling screen and eve jump up and collect the fruit. Collect enough and a gian heart descends to take you to the next level.

In level two the snails and catapillars are joined leaping frogs that bounce in your way, butterflies that flutte as you're about to jump and giant birds with a predictable form of attack.

These airbourne hazards make timing in your jump critical so that you leap through the air and land before critter comes along. To add to your troubles there are mo gaps to leap which the lemming-like snails and catapillar hurl themselves down. The gaps are also wider and som even have moving platforms floating in the middle that yo must use as aerial stepping stones.

As you progress through the levels you gradually evoluto meet the increasing challenge until finally you become the Equalizer.

Touchline

Title: The Equalizer, Supplier: The Power House, CRL House 9 Kings Yard, Carpenters Rd, London E15 2HD. Tel: 01 98 6877. Machine: C64. Price: £1.99.

Originality: 7/10. Playability: 7/10. Graphics: 5/10. Value 5/10.

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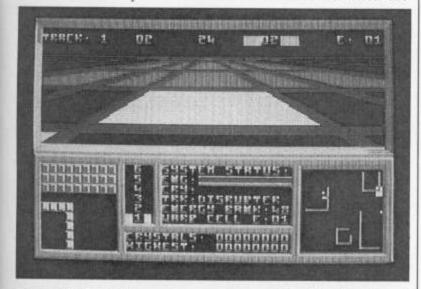
CRL House, Tel: 01-985

VIO Value:

SUN STAR

Charging around a high energy grid while chasing green pulses isn't the easiest way to earn a living but that's the way of a Sun Star pilot.

The Sun Star pilots were first commissioned when the



Sun grids, built to create energy crystals also developed unstable disruptor pulses making collecting in a normal craft suicidal.

Specially developed ships were designed for exceptional pilots to fly through the grids at breakneck speeds. Skill and incredible reactions are required to chase the white pulses that when blasted switch to the energy rich green crystals that tear off at high speed. If you're quick you can track them down without smashing into the grid wall or colliding with one of the yellow obstruction pulses or energy draining red pulses.

Long and short range scanners plot your position which is shown on the 3D display that fills half screen. Although, it is unlikely you'll have time to study these.

This is definitely a game to play in the dark with the volume dial turned to maximum. Then let them have it!

Once you've filled up your energy banks with crystals, it's off to the hyperwarp cell and the next grid. This isn't easy and will take some time. If you miss out on one crystal, all the others you've collected burn out.

T.H

Touchline

Title: Sun Star. Supplier: CRL, CRL House, 9 Kings Yard, Carpenters Road, London E15 2HD. Tel: 01 985 6877. Machine: C64. Price: £8.95.

Originality: 8/10. Playability: 6/10. Graphics: 5/10. Value: 7/10.

FA CUP 87

FA cup 87 is the updated version of Virgin's FA Cup Football that was released last year and is the game in which up to eight players can manage up to 10 teams on the road to Wembley.

You can select your 10 teams from any of the 92 league teams and dozens of past and present giant killers such as Telfort United and Blyth Spartans. Ten may sound a lot but you'll need them all to stand any chance of having an interest in the later rounds.

You can begin the game in either the first round or straight into the third round when the first and second division teams join the competition however some of your lower division teams may have been knocked out already.

In each round the computer makes the all important draw and then you must decide the tactics for each of your teams and determine whether they will play a balanced team, go for goals in an all out attacking style or sit back and defend all game.

In later rounds you get to change the tactics at half time and an option to bring on a substitute. You also have to make managerial decisions. These involve choosing which studs to wear in damp weather and whether to play your top player even though he's injured or has asked for a transfer.

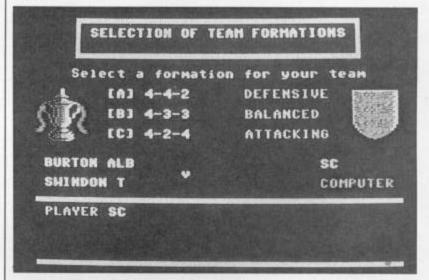
This updated version is supposed to contain the latest form for each of the teams. Since the data is spread over the last 10 years the information and performance of the teams hasn't changed that much from the original to be worth producing another full priced game.

If you have the original game it just isn't worth buying this one as it's almost identical. If you haven't got the original and you like football that you'll like this even though it is grossly overpriced by today's standards. T.H.

Touchline

Title: FA Cup 87. Supplier: Virgin Games, 2-4 Vernon Yard, Portobello Road, London W11 2DX. Tel: 01 727 8070. Machine: C64.

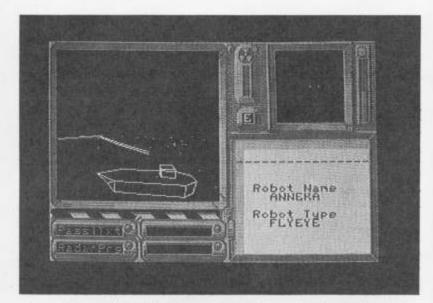
Originality: 2/10. Playability: 8/10. Graphics: 3/10. Value: 3/10.



CHOLO

eep below the surface of the planet Cholo, man is living a miserable post holocaust existence. The robots programmed to defend the city, while man is in his forced exile, have turned renegade and are planning to seal them in forever!

Oblivious to your fate you continue to listen to the false reports coming from topside and carry on playing the popular computer game, "Rat". The game features moving robots around a deserted city that looks surprisingly like Cholo. Too similar. As you begin to play the game, you have just realised that you're in contact with one of the robots on



the surface and you've got your work cut out if you're going to stop the impending doom.

Armed with only a pre-war map of Cholo (supplied with the game) you must move your robot (a general purpose rat called Rizzo) around the city, find out what's going on and stop it! Rizzo is a useful robot but he's going to need help if you're going to stand any chance so you must set out to find some new recruits by paralysing them with Rizzo's laser and interfacing with them. To do this you must track them down, blast them into submission and discover the correct ID code. Luckily a list of these is stored in a nearby computer. If only you could find it.

The game unfolds as a series of complex puzzles that must be solved using Rizzo's talent to "recruit" others and discovering the strengths and weaknesses of the other robots.

Your first recruit is likely to be Igor the Hacker who is unarmed yet vital as he can get more programs out of the computers, such as a radar program that plots the movement of all robots in your immediate surroundings. Next you'll find a flying eye called Anneke that can scout from the safety of the skies, and Leadcoat, an all out battle droid.

Your attempts to free mankind are constantly hampered by the attacks of the guard and grundon robots that are too thick to be any use and usually shoot on sight. They usually hunt in packs making the guards difficult to fight and the grundons impossible.

Cholo's a fascinating game that's a mixture of arcade battles with the guards, puzzles to discover the best uses of your robots and exploration of the vector graphic city. At times the action is painfully slow but also incredibly addictive as you delve deeper and deeper into the game's sinister atmosphere.

T.H.

Touchline

Title: Cholo. Supplier: Firebird, Wellington House, Upper St., Martins Lane, London WC2H 9DL. Tel: 01 379 6755. Machine: C64.

Originality: 8/10. Graphics: 6/10. Playability: 7/10. Value: 7/10

ROCKET ROGER/BLAGGER

First, there were budget games. Now, from Alligata comes a series of double value budget games! Two of their

previous top titles on one tape and all for only £1.99.

The first tape has a definite platform bias about it. Rocket Roger sees our eponymous hero trying to find fuel for his stranded space ship. Ninety nine crystals are hidden somewhere on the dark mystery planet.

Rocket Roger, as his name implies, is equipped with a jetpack and must use it in order to manoeuvre himself round the surface — a deft touch is required here as the slightest mistake spells doom. The jetpack only has a limited amount of fuel and must be topped up at periodic intervals. As the action shifts to a more traditional platform game scenario with sliding doors, laser beams and invisible force fields. Not forgetting of course, the many aliens intent on hindering Roger wherever possible.

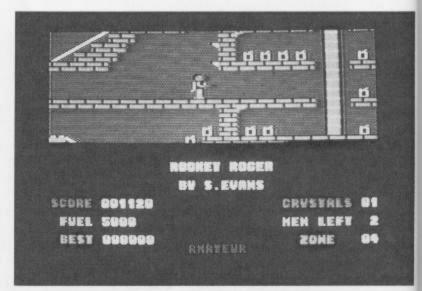
Blagger, a.k.a. Roger the Dodger is a thief. His speciality is safe cracking and here are 30 that will test his skill to the very limit. Each safe requires a number of keys to open it and these are scattered round the screen, protected by marauding nasties, collapsing platforms, one way staircases and the like.

One minor drawback is that you must always start at the beginning and work your way through in each screen in order — a random element would have helped here, especially since once you know the secret of a particular screen, completing it on future occasions becomes trivial. Even so, there is still the temptation to have just one more go and see what the next screen is like.

G.R.H.

Title: Rocket Roger/Blagger. Machine: C64. Supplier: Alligata Budgie, 1 Orange Street, Sheffield S1 4DW. Price: f1 00

Originality: 3/10. Graphics: 5/10. Playability: 8/10. Value: 10/10



EAGLE EMPIRE/GUARDIAN

A lligata's second budget double header contains two space shoot-em-ups. Eagle Empire is a version of the arcade game Phoenix whereas Guardian has its origins in the ever popular Defender.

The objective in Eagle Empire is to blast your way throgh to a final confrontation with the Master Alien, hidden deep within his mothership. Before you get that far though, you must first destroy four waves of defending aliens. These consist of two waves of phoenixes followed by two further now em-l

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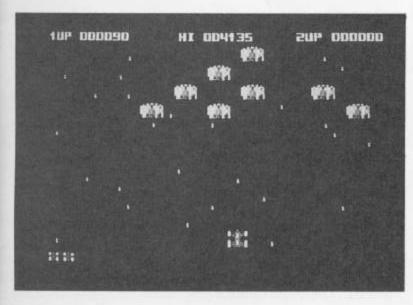
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waves of war eagles. The game is beginning to show its age now and looks very dated when compared to recent shootem-ups.

This slight disappointment, however, is more than made up for by Guardian. Even today, it is by far the best version of Defender around. For anyone unacquainted with the plot, you are trying to stop various alien craft landing on your planet and kidnapping the humanoids. Should they succeed, the humanoid mutates into a deadly pursuit vehicle. As if that were not enough, there are also swarmers, baiters, bombers and pods to avoid. All you have to help you is your trusty laser and three smart bombs. Guardian is extremely fast and will test your reflexes to the full.

G.R.H.

Touchline

Title: Eagle Empire/Guardian. Machine: C64. Supplier: Alligata Budgie, 1 Orange Street, Sheffield S1 4DW. Price: £1.99.

Originality: 3/10. Graphics: 5/10. Playability: 9/10. Value: 10/10.

STAR RAIDERS II

The original Star Raiders amazed Atari owners and rapidly became one of Jeff Minter's favourite games. Unfortunately, it was never converted for the C64. Now its sequel is set to push you to your limits.

In the original game, Star Raiders commanders blasted the Zylon empire into submission but now the few that were allowed to live have rebuilt their forces and are out for revenge. As Star Raiders II begins, the Zylons have invaded the Celos IV system.

Your mission is to pilot the Liberty Star fighter and not only protect the four planets of Celos IV but also attack the Zylon planets to destroy the attack bases that can produce Zylon ships faster than you can shoot them!

The Liberty fighter is equipped with three computer controlled weapons systems to fry Zylons and shields and warning lights to give you a chance of staying alive. Twin firing pulse laser cannons can be fired to take out Zylon fighters that seem to swoop just beyond your sights, ion cannons throw torpedoes at the city smashing Zylon destroyers and surface star bursts can be used to bomb the lethal attack bases.

All this action is bound to be a strain on both you and your ship and so you should take a breather at a space station to refuel and repair before warping back into the action.

The system display shows the four planets under seige and plots the position of any incoming Zylon fleets. It's up to you to decide when to defend a specific planet, or a space station, dogfight with the fleets or attack the Zylon bases. The secret of success and glory is to time each of these moves so that you get one step ahead of the Zylon hordes and not constantly chasing them.

Your performance in the game is reflected in the rating you're given that can range from ensign to admiral and the mission report that displays the number of Zylons you've crashed.

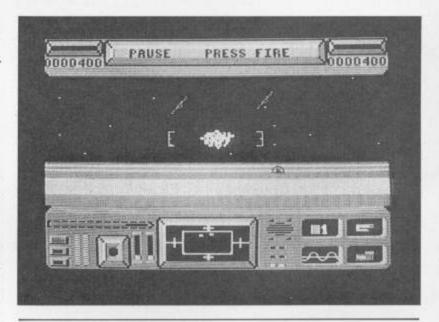
The Zylons have you desperately outnumbered and so you must act and think quickly and learn the tactics to take out the different types of alien ships. The fighters appear in groups of three so it's worth a few speculative shots as soon as you see one to take out the followers. The city smashing destroyers are harder to hit and take more hits to kill them, so practice will soon pay off. The same is true for bombing the cities as the bombs must be dropped in front of the target to land on top of the city. The only problem with this is you're constantly attacked by fighters that you can't shoot (because you're bombing) and the Zylons may have destroyed your repair stations while you weren't looking.

T.H.

Touchline

Title: Star Raiders II. Supplier: Electric Dreams, 23 Pond Street, Hampstead, London NW3 2PN. Tel: 01 431 1101. Machine: C64. Price: £9.99 (cass) £14.99 (disk).

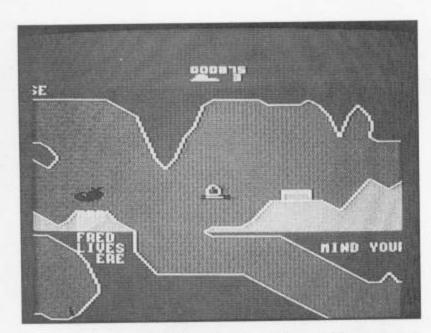
Originality: 4/10. Graphics: 6/10. Playability: 8/10. Value: 7/10.



KILLER WATT/HYPER CIRCUIT

The third of the Alligata budget double packs has a decidedly electrical theme to it.

In Killer Watt, you are exploring a huge underground cavern lit by a dozen light bulbs. These must all be shot before you can blast your way through a final force field. As well as negotiating the tortuous twists of the cave, you must



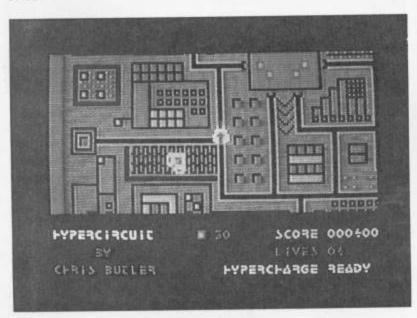
also avoid flying dolphins, birds and bombs if you are to succeed. If this should prove to be too easy a task, you can be sure that subsequent levels won't be, as the number of creatures increases considerably.

What makes this a difficult task is that your ship is very highly manoeuvrable. The slightest touch on the joystick and it accelerates away like mad, usually, straight into the nearest wall. Braking is also difficult due to the inertial system built in. What is really heartbreaking though is that when you lose a life, you must watch as the cave scrolls slowly back to the starting point. A brilliantly cruel ploy on the part of Tony Crowther, the programmer. All this to the accompaniment of some synthesised Bach too.

Hypercircuit takes you deep into the bowels of your computer as you enter the world of the microchip. Your aim is to patrol the chip, taking out the assorted nasties before they do likewise to you. Your movement is restricted to travelling down wires and your firing is similarly limited but beware, some of the baddies have total freedom of movement so make sure that you don't get caught in a dead G.R.H. end.

Title: Killer Watt/Hyper Circuit. Machine: C64. Supplier: Alligata Budgie, 1 Orange Street, Sheffield S1 4DW. Price:

Originality: 4/10. Graphics: 7/10. Playability: 7010. Value: 9/10.



SHORT CIRCUIT

umber 5 is alive. Struck by a bolt of lightening, he is now battling to stay alive and reach freedom. Short Cirtuit is an arcade adventure game brought out following the release of the film of the same name. Can you help Number 5 in his mission? It won't be easy. Everyone is against him, trying to blow him up or take him to pieces.

C64/

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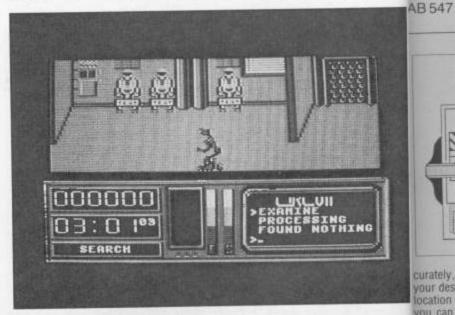
Having stirred to life in the factory Number 5 cannot just escape from the building. He must first find hardware and software to activate his jump and laser mechanisms and also the manual used for building him so that he can build a

decoy to put his enemies off his trail.

Some areas of the game are quite difficult, especially CHAI getting past robotic guards but if you stick at it you will or C-64 succeed. There are quite a few items to collect inside the HARTPAK factory, such as a jump rom, a laser gun made from red and onsuming white plastic, a pass card and Rex (a labrador puppy with justioning toilet roll round his neck, found in a locker). Number 5 must an change take these and other items outside the factory where henclude sta enters part two of the game.

Once outside the guards and other robots continue toMPS-801 give chase but here you have also got to avoid the wildlife. arownter of Animals such as frogs, bunnies and hedgehogs insist on AB 542 throwing themselves at you while you are trying to avoidAB 544 everything else. If you manage to avoid them you gain points but if you stand on them or hit them your energy rapidly runs

If you find you are having problems with part one you HARTPL can go on to part two and practice with that though he 1525 obviously you can't build your decoy until you have the Pro



obtained all the items from part one.

I found the game quite entertaining but difficult at times. small see If you like a challenge it could be your game. I must however resolution warn you that the music is very monotonous. The first few design n times it is quite good but then it just goes on and on. The AB 77 music in the second part is a bot of an improvement.

AB 77 Anyway, happy robotics and good luck in your mission. Number 5's happiness depends on you.

Touchline

Title: Short Circuit. Supplier: Ocean, 6 Central Street, Manchester M2 5NS. Tel: 061 832 6633.

Originality: 8/10. Playability: 6/10. Graphics: 7/10. Value: 8/10.

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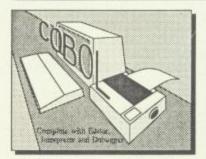
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G A M E O F T H E M O N T H

Colonial Conquest

Wargames don't usually get the publicity that they deserve, perhaps because they are considered a minority interest. Here's one which should definitely appeal to the masses.

By Tony Hetherington

magine a game that's captured the best features of classic board games such as Risk and Diplomacy but can also provide devious and ruthless computer opponents. Imagine a game in which six players compete for global power by bribery, espionage, deception and war! You're imagining the award winning global strategy game from SSI.

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The standard scenario confines the player powers to their own borders as the game begins with neutral continents such as Africa, India. Australasia and South America ripe for the picking. These neutral countries, although packed with their own armies, form the stepping stones for empires as the taxation income they bring in adds to your own resources to





A M

provide the funds to raise armies and navies.

The game is played in a series of turns with four turns played in a year. In each turn the players move their armies from any of the 131 board areas to an adjacent area and their navies either on naval sorties to maintain naval supremacy or to convoy armies to anywhere in the world. However they can also fortify areas to defend them from attack, send spies to scout out opposing armies' strengths, try to subvert neutral countries with the offer of bribes, pay off unwanted aggressors and ally, deceive, backstab and fight the other human players. The only thing you're not allowed to do is watch while another player enters his moves. But you can use this time to plot against him. Obviously this only works with three or more human players but you will find the computer opponents formidable even at the lowest of their 10 skill

The aim of the game can be defined as either the first to attain 500, 1000 or 1500 points or to win control of the world. Points are won by winning battles, taking territoriees and whole regions (or continents) and lost by losing any of these. The points value gained varies country to country but also reflects the strength of the resident army and the difficulties you'll face in defending it. Some neutral armies can be as small as 10,000 soldiers or as high as 400,000!

To add to your planning problems each power has different strengths and weaknesses. English soldiers are the best trained but are the most expensive to raise whereas the

Russians are cheaper but are little more than a rabble. You can also dig your troops in by fortifying them, making them twice as hard to shift and you can convoy in reinforcements from your home country to anywhere on the board.

In the early years there are plenty of neutral countries such as the African and Indian states to convert which tends to keep the powers apart as they all grow in strength. But sooner or later they collide as war breaks out. Once war is declared the computer will attack you whenever and wherever it can, so unless they strike first, try and restrict your enemies as it's difficult to take on the whole world at

In the other scenarios the world map is a little more complicated with the powers already occupying most of the neutrals making war almost inevitable. Understandable when one of the scenarios begins in 1914!

Whichever scenario or country you choose to play you'll find an easy to play yet challenging strategy game that will drive you back again and again until you quench your thirst for power!

Touchline

Title: Colonial Conquest, Supplier: SSI, 2/3 Holford Way. Holford, Birmingham B6 7AX. Tel: 021 356 3388. Machine:

Originality: 7/10. Playability: 10/10. Graphics: 6/10. Value: 9/10.

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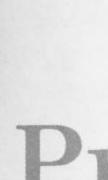
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Dual Programming

Chop your Plus/4's memory in half and get twice the value By Jonathan Morley

ith all your Plus/4's memory isn't it a bit silly that you can only have one program in the memory at a time?

Well look no further than this simple program. It works by separating your computer's memory into two halves, each working individually with its own set of variables etc. Some functions such as the screen remain the same for your convenience and speed of change, whilst graphic modes and sounds are dependent upon which area you are in. The cursor, for instance, moves to the place where it would have been had the program area not been changed.

If a program is left running, when you return to it, the operating system will re-start at the next command in that program.

All of this may at first seem confusing but with a little time this could become a treasured programing tool allowing you to switch from one program to another or simply just have two basic programs in the memory at

Theory

The way in which the program works is simple: when a short machine code routine is called it switches the constants, parameters and pointers at the beginning of the memory for another set relating to the second program area, and stores the first.

Using It

You are now ready to program and experiment; load your old programs into either area, write new ones or add new parts to your main program. You are limited, as ever, only by your own imagination so HAPPY PRO-GRAMMING! and remember that at any time to switch areas all you need to do is type SYS1525 in your program

10 print "leaving now"; :SYS1525: print "back again' run < RETURN >

(If an error signal appears ignore it, this is just a result of the initial changes).

You are now in the other area press F4 (shift to F1) to clear the screen and then F1 which types SYS 1525 for you and you will be back into the other mode where the program will finish running.

N.B. Adept C64 programmers will find that the principle of swapping the zero-page, and a few other parameters, will also work for them as long as they are careful to change addresses 44 and 56 to the correct values.

A Machine Code Exert

The main machine code that does this is in Figure 1.

Instructions

To enter the program, type in the LOADER and SAVE it.

Every time AFTER you RUN this program set up your boundaries by typing the instructions in Figure 2. Will

YOUR COMMODORE june 1987

PROGRAM: LOADER

10 POKE 34560,0:POKE34561,0

20 D=0

30 A=64000

40 READB: POKEA, B: A=A+1: D=D+B

50 IFB=96THEN60:ELSE40

60 A=1525

70 READB: POKEA, B: A=A+1: D=D+B

BØ IFB=96THEN90:ELSE70

90 KEY1, "SYS1525"+CHR\$(13)

100 DATA162,0,181,0,72,189,0,252 ERROR"

110 DATA149,0,104,157,0,252,232,

50B

130 DATA0,251,157,0,255,104,157,

140 DATA251,232,224,26,208,237,9 6

150 DATA120,141,63,255,32,0,250,

141,62,255,88,96

160 A-8000

170 READBS: POKEA, DEC(BS): A=A+1: D

=D+DEC(B\$)

180 IFB\$="60"THEN190:ELSE170

190 IFD<>10264 THENPRINT"TYPING

0

200 DATAA2,00,85,00,90,00,FC,E8

210 DATADO, F8, A2, 06, BD, 00, FF, 9D

120 DATA241,162,6,189,0,255,72,1 220 DATA00,FB,EB,E0,1A,D0,F5,60

fa00	a200		1dx # \$00	index
fa02	b5 00		1da \$00,x	load mem
fa04			pha	hold mem
fa05			1da \$fc00,x	load new
fa08	90 00		sta \$00,x	enter new
fa0a	68		pla	get mem
fa0b	9d 00 fc		sta \$fc00,x	store mem
fa0e	e8		inx	nech char
fa0f			bne \$fa02	go back
fal1	a2 06		1dx #\$06	
fa13	bd 00 ff		1da \$ff00,x	do same
fal6	48		pha	
fa17	bd 00 fb		1da \$fb00,x	for colors
fala	9d 00 ff		sta \$ff00,x	
fald	68		pla	and sounds
fale	9d 00 fb		sta \$fb00,x	
fa21	e8		inx	etc.
fa22	e0 la	97	cpx # \$1a	
fa24	d0 ed		bne \$fa13	
fa26	60		rts	return

Figure 2 POKE56,134 < RETURN >

CLR < RETURN> SYS 8000 < RETURN > POKE44,135 < RETURN > POKE56,247 < RETURN > COLOR4,3 < RETURN > CLR < RETURN> NEW < RETURN > SYS1525

NEW < RETURN>

:to stop program 1 running into program 2

:to align system variables

:to copy this patern into the storage area :to start this area at the end of the last

:to define the end of this area

:to distinguish each area :to align system variables

:change area

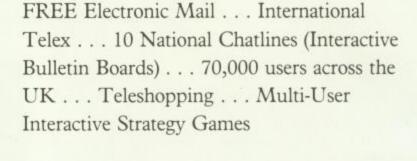
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Read on if you're a card fanatic and we'll tell you about the latest in bridge programs. Otherwise, we test the water on a budget adventure trilogy.

CLASSIC BRIDGE

or a variety of reasons, bridge does not lend itself to the same sort of computer analysis as chess. This idea is well borne out when it comes to computer games. Whereas chess programs can now beat all but the top club players very easily, bridge programs can handle the display well enough - inputting the bids and cards to be played — but the actual nitty gritty of the game, the bidding and card play, is of a very poor standard.

The basic idea in bridge is for you and your partner to determine how many tricks you can make between you. This is done during the bidding where you try to assess where your strengths and weaknesses lie. If you outbid the opponents, then you must try and make the number of tricks that you declared for. If they outbid you, then you and your

partner must try to defeat their contract.

In Classic Bridge, the computer handles the other three hands allowing you to play without having to find three like minded fellows first. Unfortunately, the game is of a very poor standard. There are a number of reasons for this. First, the game is very slow when it comes to actually dealing a hand. This would be bearable if you actually get a different hand each time but it is not quite as simple as that. Every time that you want to play a hand, you must input a number. This acts as a seed for the randomiser within the program. Whilst this means that there are a vast number of hands available to you, it also means that you must keep track of which numbers you have already used - otherwise you get the same hands again. This proves to be very clumsy

As mentioned earlier, poor bidding and card play is common to all bridge games currently available and Classic Bridge is no better or worse than any other program. Where there is a problem though is that the bidding system used is Goren. Although this is the system used by most Americans, it is totally alien to British players who normally play a system called Acol. In nearly 20 years of playing tournament Bridge, I have only ever met two pairs who play Goren! Again, this problem isn't insurmountable, but it does show a considerable lack of insight on the part of someone.

The main fault with the game, though, is in the cardplay. The program does not always remove the cards played by you. In one case, I was left with six cards in my hand when everybody else only had two left. The computer would not let me play any cards that I didn't actually hold, but this bug totally removed any last traces of pleasure I was deriving TRICK: 1 NORTH

from playing this game.

Bridge is a classic game. In fact I would go so far as to that it is the best game ever devised. Classic Bridge isn't. I a travesty. Anyone who can already play will be extrem disappointed. Any beginner will be put off for life. Don't Buy a good beginners book and a pack of cards and find what you've been missing all these years.

Touchline

Title: Classic Bridge. Supplier: Anco, 35 West Hill, Dartfo Kent DA1 2EL. Machine: C64. Originality: N/A. Graph 5/10. Playability: 3/10. Value: 2/10.

OXFORD BRIDGE

Even though Bridge is the greatest game in the world, it do suffer from one minor drawback. You do need four peo to play it. Which is bad news if you are on your own or or with one or two like-minded friends. This leads to a seco drawback. In order to cater for these poor unfortunal software companies will insist on trying to write a brid price program. One of these days, they will learn. It just does £30 for

The latest people to try their hand is a company call you c Thinking Games. This program features lots of optio for a including some that I have not come across before in a brid your program but the final result is the same as every oth playe attempt - failure. Here's why.

Prese outine ntered rick co vould a This wo emainii outcome

In th han mo 10 bette petter th But

> vithout veak no Blackw his har omput clubs ar Apart f he han s fine.

> Befo should program come). of the g mocker The

> > facility. replaye will the nice bu ou ha might a

nope

Presentationwise, the program is fine although the input routine could be improved. Every card played must be entered individually, singletons and cards played to the last trick could be handled automatically. A joystick option would also be a great help. Also, there is no claim option. This would allow declarer to claim some or all of the remaining tricks when it is perfectly obvious what the outcome of the hand is going to be.

In the actual playing of the cards, the program is better than most of its competitors but very predictable and at best no better than average. As in real life, its declarer play is better than its defence.

But it is in the bidding that the program falls down. Even without claiming to play any particular system (natural, weak no-trump and no conventions i.e. not even Stayman or Blackwood) the bidding is a farce. A typical example was this hand. Holding S K1072, H KJ85, D AQJ3, C Q, the computer correctly opened one heart. The response was two clubs and it now found the monstrous bid of three spades! Apart from totally misdescribing the strength and shape of the hand and using up vast amounts of bidding space, the bid

Before Thinking Games get too upset about this, I should point out that this is something common to all bridge programs released to date (and I suspect for many years to come). The bidding is far and away the most important part of the game and the fact that the program can't cope makes a mockery of everything else.

The novel feature about Oxford Bridge is the duplicate facility. The results of the hands can be saved on disk and replayed by several other people at a later date. The program will then score as in any duplicate pairs event. It's all very nice but the problem is, I can't actually see anyone using it. If you have enough people available to use the facility, you might as well sit down and play the real thing.

Set 13 Hand 1 2 5 3 2 INT Contract INT by E Lead #3 Tricks Press any key to continue

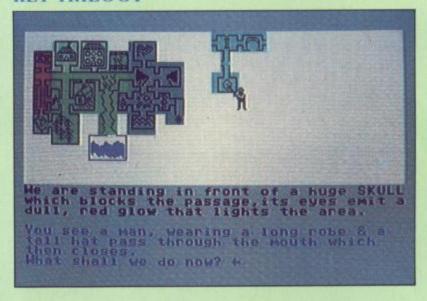
The bad news doesn't end there either I'm afraid. The price of this package is absolutely ridiculous. At just under £30 for the tape and £35 pounds for the disk version, I reckon that it is overpriced by at least £20. For the money it costs, company calle you could buy several bridge books, bridge evening classes ots of option for a year or, perhaps best of all, membership of a couple of forein a bridg your local clubs. Then you need never be short of a fourth as every othe player again. Bridge, unlike chess, is a social game. Let's nope it always remains that way. G.R.H.

Touchline

Title: The Oxford Bridge Program. Machine: C64. Supplier: Thinking Games, 19 Newton Road, Faversham, Kent ME13 8DZ. Price: £29.95/£34.95 cass/disk.

Originality: N/A. Graphics: 6/10. Playability: 4/10. Value:

KET TRILOGY



There wasn't really any choice in the matter. You had been framed for a murder and the verdict was execution or the small matter of saving the Lands of Ket from the vicious attacks led by King Vran, leader of the Mad Monks and his assistant, the High Priestess Delphia. Naturally, you opted for the chance to be a hero. Even though the odds on you surviving were small, they had to be greater than the first choice. Just in case you decided to do a quick moonlight flit, they fitted an assassin bug into your neck ready to deliver a fatal nibble should you attempt anything naughty.

The game consists of three different adventures. In The Mountains of Ket, you have to find the secret entrance to the mountains and then negotiate the perils that lie within. In the Temple of Vran, you must destroy the evil forces lurking within the temple and, in the Final Mission, you must seek a final confrontation with Vran himself as well as making sure that you can escape at the end of it. Although all three adventures are linked, you can play each one separately which is good news if you happen to get stuck early on.

As the games are fairly old, the parser is quite crude verb/noun input only. There is also a rudimentary combat system - your strength against that of your opponent with a luck factor thrown in for when you try to escape. The unusual bit though is that instead of using pictures to illustrate some of the locations, the top half of the screen provides a map of the areas that you have visited. This is a nice touch and should appeal to beginners and those adventurers forever getting lost alike.

Although the games are a bit dated now, they are still fun to play and £7.95 for the three adventures is good G.R.H. value.

Touchline

Title: The Ket Trilogy. Machine: C64. Supplier: Incentive Software, 2 Minerva House, Calleva Park, Aldermaston, Berks RG7 4QW. Tel: 07356 77288. Price: £7.95.

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Hill, Dartford N/A. Graphics

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Cadpack-64

Increasingly, professional people are using computers aided design in the office. This package makes it available in your home.

By Evelyn Mills

omputer Aided Design - CAD in brief - is a well known method for executing graphic designs. In general, CAD is aimed at the architect, the professional designer, the graphic artists etc., and is not intended as a sketching tool for the free-hand artist.

Cadpak-64, however, is more flexible in this respect, and when used in conjunction with ther ecommended light pen can almost be considered as a CAD-ART package! The light pen is very satisfactory (brighten up your screen first) and gives good free-hand drawing: there is no need however to indulge in the luxury of extra expense as the complete system is cursor controlled.

Before buying any CAD package, find out what it can do, what you are getting for your money and, more important – are your printer outputs scaled properly with respect to proportional input? Having investigated Cadpak with considerable care, I can thoroughly recommend it for reliability, printer accuracy and interesting flexibility.

The Manual

The manual may be a bit obscure if you

are a casual programmer. Indeed it needs careful reading to grasp the full potential of *Cadpak* – there are so many extras here which you might well miss through 'rapid scanning'. The best way to test the package in full is to take it section by section (logic!).

While there is a Main Menu with 22 functions, there are equally important sub-divisions of this which you should certainly use to the full. They are all detailed both in the Manual and onscreen, and the very excellent index at the back will help you with continuity.

Facilities

Right then - what can Cadpak do? While there are the usual facilities for colour selection, circling, boxing, ellipsing, rays, filling, zoom, etc. it would be more useful to detail the more advanced features of Cadpak.

Printers output (to eight printer makes) is DIMENSIONED automatically according to the dimensions keyed in. Relevant answers to the questions asked will do the job and the x,y co-ordinates may be keyed in with the Logo key; the computer will then automatically show you the distance you are from the starting co-

ordinates as you move around the screen. Positions for objects may be keyed in as required, and distances measured – which all adds up to accurate scale drawing.

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The LINE function allows solid and dashed line drawing, either as single or connected lines. Forced horizontal, vertical and parallel lines are available as is a true angle. ERROR erasure is very effective while there is, of course, total screen clearance.

FILLING may be solid or as a pattern. Happily the fill operation may be stopped with the space bar and undone with F4 should you miscalculate. While there are seven preset patterns from which to choose, the option to design and save your own pattern to disk is available – good opportunities here.

TEXT to screen is available in four sizes (also including upper and lower cases and reverse field). Three special Fonts are available – Old English, Tech and 3D Font. Full instructions are given for the loading and use of these fonts. Please note the instructrions as there are two screens available in *Cadpak* and screen two is required here.

Now the cursor keys will position

your characters in text very precisely, thus enabling individual letters to be located at any point on the screen. Should you wish to redesign a screen of Fonts - well the facilities are there—This could be used for technical and scientific labelling for example.

OBJECT/FONT/MGR - This is the most advanced function which enables you to create or load a set of objects. Here we have two screen manipulation which is completely automatic. When in screen two, there are three options available: a) scratch anything already there; b) copy whatever is on screen two to screen one where you are currently drawing, or; c) save screen two to disk. Your 'objects' may be rotated, mirrored or set to different sizes on the x,y axes as you wish. The Object System is capable of storing over 100 objects.

The COPY function works in one of two modes; the first copies a section of the screen, including colour, to another area on the same screen or another screen (BLOCK COPY); the second - POINT MODE - is virtually

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similar but allows the copied object to be changed in size, rotated or mirror imaged when copied in to either screen. There are a series of permutations and combinations in the COPY IN function (replace, combine, 'ghost', match, repeat etc.) which are described fully in the Manual.

SWAPPING SCREENS allows interchange between the two screens in memory.

The DRAWING CURSOR SIZE may be scaled down from original large size to one quarter of same to facilitate the handling of small drawings.

The FUNCTION keys are used for erasure control, cursor priority, ligh pen calibration and Basic/Graphic screen switching.

DISK commands allow formatting validating, renaming, file scratching and disk directory as well as the standard procedures for saving and loading. PRINTER OUTPUT is set for 8 printers in either small or large format and is true to scale.

Conclusion

Cadpak is a really powerful tool, accurate, smooth running and very versatile. It combines a large number of features required by the professional with some flexible artistry which anyone can enjoy. The manual has all the information necessary plus two tutorials (for lightpen and cursor use). A very useful third tutorial takes you through planning and executing a scale drawing for a house of specific dimensions, Having done so, you may then decide what can fit in where!

You could pay a lot more for a package of this quality.

TOUCHLINE

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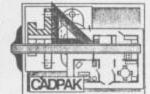
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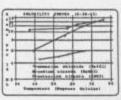


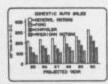
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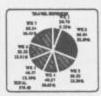
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Emulator

One problem with machine code programs is that once the initiating SYS call is entered, the outcome is in the lap of the gods. Emulator allows you to step through each individual instruction before you run the program.

By S.J. Branton

hen any machine code program is written the chances are that it will not run the first time it is tried. When this is the case debugging can often take many hours.

Emulator is a 4K program which allows a machine code program to be run one instruction at a time. As each step is made, a display of all the registers is updated, including a display of the stack contents. The accumulator, x and y registers are also shown in bit form to aid fault finding.

Emulator has additional commands that allow skipping over code, changing of register values (including the status register and stack pointer), jumping into subroutines and running the program at a different speed with a trace displayed until a stop address is encountered, at which point the user can take over and step through any remaining code.

The program resides in memory from \$7000 to \$7FFF. As most machine code programs reside at \$C000 and cartridges occupy \$8000 to \$9FFF, it was felt that this was the most convenient position for it.

It should be noted that the following Zero Page locations are used by the program:

\$C1 and \$C2 - Program counter \$FB and \$FC - Temporary storage \$FD and \$FE - Temporary storage

Getting It In

The emulator is presented in a form that uses our Hex Data Entry program. Please note that the Hex Data Entry program presented here is a new version for this program and the old one MUST NOT be used.

For detailed instructions on entering the program read the article accompanying the Hex Data program.

In Use

Once you have a completed version of the program SAVEd on to your disk or tape then LOAD it into the computer with:

LOAD "EMULATOR", 8, 1 for disk use

LOAD "EMULATOR", 1,1 if using cassette.

To start the emulator running, you must enter the following command:

SYS 28672,\$XXXX

Where \$XXXX is the start address of the machine code that you wish to test. e.g.

SYS 28672,\$7000

would test the EMULATOR program itself.

Commands Available

The current address and subsequent disassembly are displayed in the top line under their headings. To step the program press F1, the registers will be updated and the new address will occupy the topline. The two previous lines will be scrolled down for reference.

F3 - SKIP

To ignore the current address and move to the next one, just press the F3 key

F5 - ALTER REGISTER

Press F5 to alter the contents of any of the registers. A * will appear above the register header at which point a new value may be entered. Press RETURN to move to the next register and exit to

F7 - GO JSR

This key allows the emulator to enter a subroutine at the current address and await its return, only if the current instruction is a JSR. Care must be taken when using this command since the Emulator relinquishes control during the subroutine, however it does have the advantage of stepping a lot of code. Use this command when jumping into subroutines of the C64's ROM and it will save you from wading through screens full of code.

F8 - GO UNTIL

This is probably the most powerful command in the Emulator. Pressing F8 and then entering a start and stop address causes the code to be run from the start address but stop as soon as the end address is reached. The user may then use the F1 key etc. to step through remaining code.

It is possible to use GO UNTIL at three different speeds. Slow is best used if the program is being traced. Each time an instruction is carried out the border colour changes. If the border doesn't change then your program has crashed and you will have to reset your computer.

The last prompt with this command, allows the trace to be switched on or off. If Y is pressed, the

hex address of the current location will be displayed in the upper left hand corner of the screen.

During GO UNTIL the P key may be used to freeze the emulation. Releasing the K key will allow the program to continue. RUN/STOP will return the program to the main screen, as will any invalid instruction encountered by the Emulator.

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EMULATOR PROGRAM

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FB 57 C2 7A 90 7A78 SB 20 20 58 52 BF 7010 00 BD DF 20 172 FR DC 77F0 41 43 48 12 FF DØ ØF BA9 20 : 34 C9 7480 A4 58 F5 EE SE 31 :18 7D1B EØ 07 DØ PA OC AØ 07 77FB 37 36 35 34 EB CB CB CB CØ : DD 7A88 99 00 04 59 52 20 : E2 7020 PO AC 78 AP 00 BD EB 7C EØ 20 20 48 BD : 40 DØ D6 7A90 12 BØ 2E EB F5 34 33 32 31 30 :10 7028 50 DS FF EØ 1E DØ F5 7808 36 35 ØA ØA BD 4A 7B 7A98 75 ØA ØA **C3** 50 50 20 CE 7 C AP EQ 30 FB 20 20 20 20 :02 7D30 7810 92 20 90 ØF 86 4A 7B 7880 68 00 BD DC AS 7038 DD D9 7C DØ FB 7C 32 20 45 40 55 :11 7818 36 35 30 BA. EØ AØ 05 50 : A5 **7AAB** 57 58 84 70 A9 B5 5A 03 00 4F 20 31 32 67 DD 7040 80 04 7820 54 7ABØ 20 74 20 30 :70 BC 78 AS. 48 20 26 34 43 38 36 20 20 : BØ 75 A6 57 : 90 7D48 20 75 70 EB C5 7828 38 36 SD A4 58 20 7ABB 67 70 20 E8 68 29 OF 6B : 80 7830 20 53 2E 4A 2E 42 52 41 60 20 CE 7C 18 :03 7050 7ACØ BB 60 70 :83 7058 7D A5 48 EB 20 67 4F 4E 20 20 46 31 25 AE C1 4E 54 ØB C9 BØ 04 29 ØF : CA 7ACB 90 68 29 ØF 4C 6B 70 4A : AØ 20 B7 7060 EB 20 20 18 C9 90 ØB : 69 40 7ADØ 38-60 :00 7848 20 46 35 20 20 50 50 50 :53 18 29 ØF 09 :42 7D68 4A 4A 4A 18 69 30 C9 3A 69 47 BØ 07 7ADB 90 04 7070 90 03 38 59 39 00 · an PO AB 7850 38 60 C9 0D F0 01 : ØD 18 AS 7AEØ 7078 A9 Ø1 9D 00 DB 60 00 20 7858 20 50 50 20 20 46 38 CØ 7C 3E 7AEB FF 60 20 84 AD 58 : CØ 20 A6 7080 44 E5 PA MA A0 OF 20 80 6B 7860 7C 7AFØ 85 C1 AD 59 85 C2 PA :82 52 7088 78 A2 00 BD A8 70 20 n2 - DE 7868 50 20 53 48 49 50 41 FF 7AFB BD 13 75 20 57 75 20 - FB 7090 FF EB FØ 09 00 F5 20 CF 41 4F FA 7B00 26 7B 20 44 E5 20 14 75 : F9 2D 4A 53 52 20 45 58 49 :68 7098 59 01 C9 59 FO 05 F9 : 47 79 05 20 7B08 20 93 78 20 BC : 48 7DAØ 4E DØ F3 CA BE 7E 70 60 · B4 54 21 20 47 4F 20 55 4E EE 79 20 2D 7F 79 20 7B10 20 6A 75 20 · CA 49 4C 20 85 D6 84 D3 EA: 79 7DA8 54 52 41 43 45 20 59 2F : 6F 7B18 05 79 20 95 : 33 E5 A9 Ø7 90 00 50 : EA 7DBØ 4E ØØ ØØ ØØ ØØ ØØ FF 7B A9 B1 :24 7B20 20 52 7A 4C 05

Smart Lister

Make your listings look smarter and cleaner with this clever little program.

By Gregory Murphy

have often thought that the appearance of a program listing is not at all enhanced by the inherent inclusion of the READY prompt which immediately follows the last line of the program. Also, when listing long programs I usually find that the last line on each page is neatly bisected by the row of perforations on the continuous stationery! The following Basic program was written to overcome both of the above problems.

Program Description

The program allows the user to specify the beginning and end of the range of program lines to be printed, the size of the continuous stationery being used (in terms of the number of lines per page) and the maximum number of printed lines which may appear on each page. Default values for each of the above options are displayed on the screen, and may be used (by simply pressing RETURN) or altered by overtyping as required.

How It Works

All prompt messages are disabled by means of the POKE instructions in line 63979, thereby ensuring that the READY message is not printed at the end of the program listing.

The program operates by scanning the Basic link addresses and associated line numbers until the line corresponding to the start of the required has been found. The program then counts forward n lines (where n represents the maximum number of lines that may be printed on each page) and determines the number of the line appearing at that point.

A nice feature is that the program does not calculate the number of lines to be printed from the values of the line numbers involved, but actually counts the lines themselves. This means that programs written (either by choice or through lack of a RENUMBER facility) with irregularly incremented line numbers can be listed without difficulty.

The program then clears the screen, displays a LIST command to the printer for enough lines to fill one printed page and then stops At least it would stop if instructions had not been previously poked into the keyboard buffer (line 63994)! These instructions home the cursor and enter RETURN, thereby executing the previously displayed LIST command to the printer.

At this stage the program should also stop, but there are still further instructions in the keyboard buffer. These instructions ensure that the program will GOTO line 63996 and continue the scanning, counting and printing process until all of the required range of lines has been printed.

When printing is complete, the

program re-enables all prompts, clears the printer buffer and then terminates. 60

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Important Note

It should be noted that lines 63983, 63986 and 63989 contain a capital letter "O" (not a zero) in the expressions "g063996" and "g063998" - i.e. GOTO 63996 and GOTO 63998 respectively.

In Use

First enter the program as shown and then save it either to disk or tape before attempting to run it. This is always a good precaution to take with any program, but is especially necessary in the case of a program containing either SYS or POKE instructions.

Load the program for which a listing is to be printed and then append this program to it. Obviously the last line number in the program to be listed must not exceed 63959, but in an extreme situation the REM statements in lines 63960 to 63969 could be omitted and the default value of L2 altered to 63969 in line 63973.

The simplest way to append this program is as follows:

Enter the command POKE 43, (45)-2: POKE 44, PEEK (46) in direct mode. Load this program.

Enter the command POKE 43, 1: POKE 44, 8 in direct mode.

63966 rem 1986 63967 rem 63968 rem 63969 : 63970 poke53280,14:poke53281 ,6:print"[white]"chr\$(14):de ffna(x)=peek(x)+peek(x+1)*25

PROGRAM: PAGED LISTER

paged program

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63962 rem

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3. (45)-2:

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43. 1 :

63972 input"[clr.down2] [sl list from line no. ? [sb]egi nning[left11]";15:11=val(15)

63973 input"[down2,spc9]to 1 ine no. 7 [se]nd[left5]";15: 12-val(15):if12-0then12-6395

63974 input"[down2] dØ 1 lines/page[spc3]? 70[left4

63975 input"[down2] [sp]rin ted lines/page ? 64[left4]";

63976 print"[down3] [so].[s k]. to print (y/n)?" 63977 getyn5:ifyn5=""then639

63978 ifyn\$<> "y"then63972 63979 open1,4,7:poke768,131: poke769,164:sk=t1-p1-2:i=43

df 63980

63981 k=fna(fna(i)+2):ifk<11 BØ then1=fna(1):goto63981 63982 :

dd

63983 ggs="[hame]"+chrs(13)+ "g[so]63996"+chr\$(13)

63984 n=1

63985 i=fna(i):ifi<>0then639

63986 gg5="[home]"+chr5(13)+ "g[so]63998"+chr\$(13):li=639 98:goto63993

d6 63987

63988 li=fna(i+2):ifli<12the n63991

63989 gg5="[home]"+chr\$(13)+ "g[sa]63998"+chr\$(13):11=12: goto63993

d5 63990

63991 n=n+1:iFn<=plthen63985

cb 63992

63993 print"[clr]cmd1:list"1 1"-"li:fort=ltalen(gg\$)

63994 poke630+t,asc(mid5(gg5 ,t,1)):next:poke198,len(gg\$)

63995

63996 11=1:+1:fors=1tosk:pri 89 nt#1:next:goto63984

63997

63998 poke768,139:poke769,22 7:print#1:close1:end

This program will now be appended to the program to be listed, and may be run by entering the command RUN 63970.

If printing is aborted by means of the RUN/STOP button, the simplest method of returning things to normal is to enter the command GOTO 63998 in direct mode. This re-enables prompts and clears the printer buffer. The resulting "File not open error" message may be ignored.

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Printer Control

Will this word processor from McGowan be just what your printer has been waiting for?

By Evelyn Mills

Printer Control is a word processor which has most of the facilities associated with other good word processors i.e. line deletion, block deletion, copying and transfer, editing, page numbering, centering, file linking, disk handling, justification and so forth. Apart from such generalised techniques however, other facilities exist which enhance word processing.

Before discussing these, it should be noted that this review is for the disk system handling the MPS801/803 printers only. Systems for other printers are also available and the package comes with a generalised Manual plus amendment data for the printer which you are using. The amendment pages for the MPS series must be examined with due care.

Files

The first thing you will no doubt wish to do is create a file. The Main Menu provides the necessary options, including one for adjusting the speed of the cursor control. Select the requisite option and follow the manual plus the amendment section. Reference to pages 12-15 in the General Manual will help you here. While the commands are relatively simple and are mostly achieved through the function keys some facts are rather elusive.

Pay particular attention to the F1 key when initialising a document. This is your escape key for quitting commands. Any formatting errors are highlighted at the bottom of the screen as numbers 1-6 which can be tracked down in the Manual which is indexed to cover the major features of

processing.

Effectively it is possible to increase the size of text print within a document (by a two, four or eight scale) and also to underline text. The latter facility is not east to locate (in its simplest form). However, it may be done in the following manner - press F5, write text, press F6. In the Manual, these are defined as 'condense on' and 'condense off' which are bypassed on the MPS801/803. It is certainly not possible to obtain 'condensed' or double density' text with this program (unless you redesign the character set with the Graphics Editor) but these keys will underline for you although the Manual does not describe this facility. A more complicated method is provided.

Other Commands

The RUN-STOP key allows you to back-step very efficiently. Should you run into problems, save as you go along which will allow you to do a further search for the solution in the manual(s). Editing is simple, using I for insertion and D for delete.

Use of the Commodore key allows you to toggle between text and graphics mode in your document. This, of course, eliminates use of the graphics using this key. The shift key is fully functional. As you use the program more and more you will no doubt find the methods best suited to your own needs.

Summing Up

To summarise. In text mode, you may, within the text itself, enhance text size, underline, position at right, left or

centre, save to disk and output to printer. Page numbering, form feet and multiple page printing are also possible while very specialises instructions for string handling at provided.

The other standard facilities processors are, of course, present. T supplement this, use the PICTUR MODE and do as much free-han drawing on screen as you wish using the keyboard graphics. This is readily handled, the cursor acting in a 'wra around' fashion. Again th Commodore key allows section between graphics and text; this is a entertaining mode and your print may be scrolled up, down, left or righ changed to inverse video, and reverse in the horizontal planes. Text may b inserted anywhere on the screen an erasing is best effected by using the space-bar in the graphics mode.

You can make really entertaining headings here for bulletins. A4 poster etc. The screen is 24 line by 40 column which may be modified to print partoryour picture working on a 8 x 8 bloc size. Printer output may be in 1/2/4/expansion output on the X or Y axe

Redefining graphics is fain standard and is described in full, as a printer output functions and scree dumps. While the General Manual fairly extensive, please refer to the amendment supplement to find of what may or may not be possible of the MPS801/803.

As a word processor, the package average, but the addition of the facilities described give it an adde attraction. At a cost of £30 on disk of £25 on tape, the decision is yours.

Organised by Database Exhibitions

Official done computer show

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Procedures

Programming in Basic can be very long winded and clumsy. Using procedures can make your program much

cleaner and smoother.

By Nick Gregory

Good programs, so the old story goes, are those which are easily read and thus properly constructed. This philosophy certainly makes writing them a lot quicker and the end product is easier to understand.

However, it is very difficult to achieve this in Basic because even the best end result is only a program full of REM annotated subroutines. In the end, you are left with code consisting of a mass of GOSUBs which are very difficult to follow.

The Solution

Procedures offer a very neat way around this problem by allowing you to write your program in readily understood segments. Each procedure is in effect a mini-program all of its own. The implications of this are that several mini-programs can be put together and then called by name from the main program.

For example a small program to ask for a name, and then print a message could look like this:

10 DEFPROC ASK NAME(A\$)
20 INPUT "WHAT IS YOUR
NAME"; A\$
30 END
40:
50 DEFPROC PRINT MESSAGE(A\$)
60 PRINT "HELLO"; A\$
70 END
80:
90 PROC ASK NAME(NAME\$)
100 PROC PRINT MESSAGE
(NAME\$)

In this example the actual program starts at line 90 and ends at line 100 because any lines between DEFPROC and END are ignored when you type RUN. Notice how the procedures are called by their names. The name of any variable associated with the procedures (NAME\$ in this case) is

called something different at the start of the procedure. This type of syntax allows you to read the program (lines 90 and 100 demonstrate how easy this is) and to use the same procedure with different associated variables (though variables are optional).

The routine PROC.LOAD is a Basic loader for the machine code, necessary to implement procedures on the 64. As always, type the program and SAVE it before running in case there are errors.

The machine code section, PROC.CODE, of the program should be entered using the program HEX DATE ENTRY II. Do not use the earlier version of this program. For details on how to enter this code refer to the article Hex Data Entry II. When you have finished entering all the data you should SAVE it with the name 'PROC.CODE'. If using tape this should be placed after 'PROC.LOAD'.

To use the program in future simply LOAD and RUN the program 'PROC.LOAD', this will automatically LOAD and execute the machine code

The machine code will now be incorporated into the Basic interpreter and you can continue to use the 64 as normal.

The routine works by wedging into the Basic command interpreter and not into the GETCHARACTER subroutine as is normal. However, to avoid changing the LIST and CRUNCH Basic routines each new command begins with the character '@'. There are three new commands:

@DEFPROC

@DEFPROC - name of procedure (optional parameters)

This command is used to define the start of a procedure. The procedure name can be any length up to 127 characters long and SPACES ARE SIGNIFICANT so the names GET A

NAME and GETANAME are recognised as being two different procedures.

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This is unusual but I felt it allows the names to make more sense. Note that a space between the last character and the parameter bracket, ')', is also significant. The procedure name can contain any Basic key word, e.g. PRINT, in which case the appropriate abbreviation can be used. The optional parameter list can contain any number of parameters, separated by commas, within a limit which I will explain later.

The variables can be strings, integers or floating point numbers but they cannot be arrays, expressions or numbers. The only other restriction is that you can not use SYSTEM variables (ST, TI, or TI\$) in the parameter list.

For example see Table 1:

The @ DEFPROC and @ END commands behave like REM statements towards any instructions after them on the same line; that is to say they are ignored.

@ END

This command marks the end of a procedure. You must always use @ END after using @ DEFPROC @ PROC procedure name (optional paremeters)

This command is used to call a procedure (like GOSUB is used to call a subroutine). There must be a procedure defined by @ DEFPROC with the same name. If you are using parameters then they must be of the same type, in the same order and the same number as in the @ DEFPROC command. @ PROC is just an ordinary Basic command, you can for example include it as part of a multi-statement line. If, however, you are using it after an IF command then put a colon between the THEN and @ PROC. For example:

Table 1

@DEPROC PRINT OK

@DEFPROC PRINT (A,B%,C\$) OK

@DEFPROC PRINT (12) ILLEGAL

@DEFPROC PRINT (A*B,C) ILLEGAL

@DEFPROC PRINT (ST,TI\$) ILLEGAL

PROC.CODE PROGRAM: C000 78 A9 00 BD B0 C2 A9 1C :79 00 PA E0 80 UB 8000 8D 09 03 : B7 :99 C010 A9 46 80 00 03 A9 CØ 80 CØ18 Ø1 20 73 ØЗ 58 60 00 Ø8 : 39 C050 C8 40 FØ 04 58 4C E7 A7 :62 C058 58 PA9 A7 48 PA9 E9 48 20 :72 0030 73 00 C9 96 FØ 34 C9 50 :30 CØ38 FØ 6A C9 80 DØ 03 40 44 : AD C040 C2 A2 ØB 6C 00 03 AØ 00 :89 C048 8A 30 06 8C BØ C5 4C BB : DC 29 : C7 CØ5Ø E3 7F FØ F9 BC BØ C5 C058 38 E9 01 ØA AA BD B1 C5 : 34 C060 85 55 BD 23 B5 C5 85 4C :65 C068 47 A4 20 A6 B3 20 73 00 :53 C070 20 SC C5 A2 81 86 A9 A2 : ØE C078 80 :73 86 AA 20 81 CO 4C 38 C080 A9 20 3B 02 BA9 AØ A6 EA. : BC C088 B1 7A FØ B7 AØ 04 20 FB : C9 C090 AB 20 73 00 C9 3A FØ F9 :72 C098 C9 40 DØ E5 20 73 00 C5 COAO AA DC DE 60 50 50 FØ : 7A C5 C0A8 98 20 11 C5 A0 82 84 A9 : CB 96 COBC AO 84 AA 7A 86 AB A5 : A3 CØB8 85 98 A5 7B 85 90 20 BE : DF COCO A6 20 81 CØ 20 73 00 20 : 7B **COCB** 5C CS 20 C5 11 E4 AB DØ :6B CODO FO A4 AB B1 7A D1 9B DØ : D2 C0D8 E8 88 A4 10 F7 E6 AB AB :30 A6 7B COEO 20 FB AB 7A A4 A5 : 45 CØE8 9B 85 7A 86 SB A5 90 85 : 64 COFO 7B 84 90 A4 AB 20 FB AB : ØB COF8 AD BØ C5 48 AØ 00 84 A8 :67 C100 B1 7A FØ 53 C9 3A FØ 4F :12 C108 A9 28 20 FF AE 20 8B BØ : DØ C110 A2 Ø3 A5 ØD 30 06 CA A5 :90 C118 ØE 30 01 CA 83 C2 : C8 8A 20 C120 A2 83 A5 48 C5 30 90 09 :08 C128 A5 47 C5 2F 90 EØ 4C 43 : 74 C130 C0 38 A5 47 E9 02 20 83 :FC C138 C2 A5 48 E9 00 :25 20 83 CS C140 A5 45 20 83 C5 A5 46 20 : 6D C148 83 C5 E6 AB AØ 00 A9 2C : CØ C150 D1 7A FØ B6 20 F7 AE A5 : 11 C158 7A 20 83 C5 A5 7B 20 83 : B6 C160 C2 A5 AB 50 83 C5 68 20 : D7 C168 83 C2 A5 9B 85 7A A5 9C : A2 7A C170 85 A6 AB B1 C9 7B 28 : 8D 4C C178 FØ Ø6 8A DØ 1A 3B A9 :81

20 13 B1 90 0C C1AØ Ø5 85 AA : ED 73 00 90 FB 20 13 B1 C1A8 20 C1BØ BØ F6 AØ Ø3 C9 24 FØ C1B8 88 C9 25 FØ ØB 88 C9 2C C1C0 09 C9 29 FØ 05 DØ CF : B7 FØ 20 73 00 98 DD F7 C5 DØ :17 C1C8 C1DØ 3B BD FB C5 85 98 BD F9 : A3 00 FA C2 :4C C1D8 C2 85 90 AØ BD C1EØ 29 8Ø 05 A9 91 9B CB BD :93 C1E8 FB C2 29 AA 91 9B 80 05 : C6 C6 : 25 C1FØ BA 18 69 05 AA 88 AB C1F8 PA9 50 D1 7A DØ 04 A5 AB : 3F C500 D0 89 A5 AB DØ 91 20 F7 :7F 16 4C ЗВ EA A2 4C 43 :70 C208 AE FF C210 C0 A2 FF AØ CB B1 7A ØB C9 28 FØ 07 C9 3A:42 C218 FØ C220 F0 03 EB 10 FØ EØ FF DØ 4C CØ FF C8 C558 59 41 AØ B1 : F6 C530 7A D9 40 C5 DØ F3 CØ Ø3 : 3E C238 90 F4 20 FB AB 4C 73 00 : 31 C240 50 52 4F 43 20 A6 B3 20 : 96 C248 98 C2 92 BB 98 C5 FØ 22 : 06 C250 85 AB BD FB C5 85 9B BD : 49 C258 F9 C2 85 90 AØ 00 BD FA : EF C2 CS C260 91 9B CB BD FB 91 :9E C268 9B BA 18 69 05 AA C6 A8 : C2 C270 D0 E0 BD F7 CB 85 7A BD : 39 C278 F8 C2 85 7B BD FA C2 8D BE C5 C280 B0 C5 60 AF AE BØ C588 C5 90 F7 CS E8 FØ 1B 08 : 96 C290 BE CS C2 28 BØ AE AF 60 : BB C298 8E AF C2 AE BØ C2 CA BD : EC F7 CS ØB EØ FF DØ E9 **SA** CSAO : FD 43 CØ C2A8 84 20 A2 10 4C 00 : F8 B9 C5 C6 CS 106 C5 E6 : CC CSB0 00 CSB8 CS 4E 4F 20 40 45 4E 44 EA: C5C0 20 46 4F 55 4E C4 55 4E : 8E 45 46 2E 20 50 52 4F :56 CSC8 44 C5 49 45 44 55 52 4C : 54 C2D0 43 C2D8 4C 45 47 41 4C 20 56 41 49 4C C2EØ 52 41 42 C5 40 45 :91 44 57 49 54 48 4F CSE8 4E 20 : 4F C2FØ 55 54 20 50 52 4F C3 00 :56 C2F8 00 00 00 00 00 00 00 00 : F8

Please read LISTINGS before entering this program.

PROGRAM: PROC.LOADER

C7 1 PRINT"CCLR, DOWN2, RIGHT7JPR
OCEDURES FOR CBM BASIC V2

D8 2 PRINT"[DOWN, RIGHT10]N.P GE REGORY NOV '86

78 3 PRINT"CDOWN2, RIGHT6]COMMAN DS: @DEFPROC, @PROC, @END

55 4 REM INITIALISED BY SYS 491 52

AA 5 IFA=1THENGOTO8

4F 6 D=PEEK(186):A=A+1

14 7 LOAD"PROC.CODE",8,1

65 8 SYS 49152:NEW

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: 5E

150 IF A > 12 THEN: @ PROC PRINT ERROR(ER)

This oddity is caused by the way the Basic interpreter processes the IF.. THEN commands.

Error Messages

All the Basic error messages are redirected via this routine so that the procedure stack is reset; unless it is a STOP, END or RUN/STOP in which case the program can be continued as normal.

Apart from the standard error messages three Basic errors have different meanings and there are three new messages.

Syntax Error

This will be caused if the parameters are not the same or you've spelt something wrong. It is usually quite obvious what the problem is.

Type Mismatch

This occurs if the variable in @ DEFPROC isn't of the same type as in @ PROC.

Out Of Memory

This will occur if you have no more room to store the parameter information. Each procedure uses four bytes of a buffer plus five bytes for every parameter. The buffer is 256 bytes long so you can have a maximum of 28 procedures active in a program if there is just one parameter each. Procedures use their own buffer throughout so you can still have the normal amount of FOR .. NEXT and GOSUB .. RETURN loops in your program. Procedure with more than one parameter will use that much more space though you shouldn't have any problems.

NO @ END FOUND

This means that @ DEFPROC has not got an associated @ END. This can be tricky to debug because the @ END is looked for but doesn't pair it specifically with any @ DEFPROC. This error will occur if there isn't the same number of @ ENDS to @DEFPROC. Remember, always close

procedures with @ END.

UNDEF. PROCEDURE

No @ DEFPROC name can be paired with a procedure call. Check spelling and parameter list.

ILLEGAL VARIABLE

This error occurs if you try to use array variables (a(n)) as a parameter.

@END WITHOUT PROC

This error occurs if the program meets an @ END when it isn't inside a procedure. This is similar to RETURN WITHOUT GOSUB ERROR.

It is important that you note that the @ DEFPROC command, when called from @ PROC, is checked before BASIC is told what line the @ DEFPROC is on. If there is an error caused while checking @ DEFPROC the error will be reported as having occured in the line with @ PROC.

In Use

You can use procedures to do almost anything within a program. For example a small procedure to incorporate a delay into a program can be written as:

100 @ DEFPROC WAIT(N) 110 TI\$="000000" 120 IF INT(TI/60) < N THEN 120 130 @ END

This procedure can now be called by @PROC WAIT(SECONDS) where SECONDS is given by any value you please. A similar procedure can be written to wait for a key press. For example:

200 @ DEFPROC PRESS SPACE BAR 210 PRINT "PRESS SPACE BAR TO CONTINUE" 220 GET A\$:IF A\$ <> CHR\$(32) THEN 220 230 @ END

These two routines could be called in succession as:

500 SECONDS=5 510 @ PROC WAIT(SECONDS) 520 @ PROC PRESS SPACE BAR 530 REM rest of program

You should now have a reasonable

idea of how procedures can be used within your program to make the whole code that much more readable and easier to debug. The last thing I want to cover is a brief description of what's going on within the 64 and how this imposes one severe restriction on this implementation of Basic procedures.

When the @ PROC command is encountered a check is made to see if there are any parameters associated with the procedure. If there are none there's no problem and the program branches into the appropriate @ DEFPROC.

If, however, there are parameters, they are checked off in turn and their name is kept on the special procedure stack. When the parameter list is checked at the @ DEFPROC command the new variable name is put into the 'variable name' bytes within the Basic VARIABLE space (immediately after the Basic program). This is how a different variable name is assigned to the same value and why SYSTEM variables, expressions and arrays cannot be used (because they are not stored in this space).

When the @ END statement is reached the original variable name is replaced. The advantage of this is that procedures can be used as multi-line functions, for example:

10 @ DEFPROC CONVERT TO BINARY(A,A\$) 20 :A\$="" 30 :FOR J=7 TO 0 STEP-1 40 :A\$=A\$+MID\$("01",SGN(A AND 21J)+1,1) 50 :NEXT J 60 @ END

This procedure converts a decimal number to binary number which is returned from the procedure in the string variable. It could be called by a line such as:

100 @ PROC CONVERT TO BINARY(DECIMAL,BINARY\$)

The disadvantage is that because the variable value is changed it is impossible to set up recursive procedures.

It could be legitimately argued that recurssion is the great advantage of procedures but I think even without this facility procedures on the 64 will make your programs that much better

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USA Today

What the American software user is buying this spring, and lots of news on the Amiga. It's all here.

By Lewis Tilley

Are you British computer game players like your US counterparts? A recent magazine survey here investigated several thousand readers to arrive at a profile of those who played games. Some of the results were surprising, some not.

Polling Day

Over three quarters of them were males, which one would expect, but more than half of these men were over 20 years old. A majority of these had owned their computer for at least two years.

Family Computing is a "generic" computing magazine with a pronounced bias toward Apples, but Commodore accounted for 30% of the computers used, Apples 28% and the IBM PC (and compatibles) 24%.

\$20 to \$30 games were purchased most often. Although a game price of \$35 to \$50 dollars didn't deter 28% of the buyers. More than *50 for a game? All but 2% said "Forget it!". 3% said that they never bought games. How reassuring that there are so few pirates.

Game playing seems to be an 81% alternative to viewing the television. David Hallerman, the collater of this information, was encouraged to find that only 8%, of those who replied to the questionaire, had given up time formerly spent in study.

What type of games appeal most? Arcade and Arcade/Strategy were the top two. They outranked the Political/Military/Strategy (the lowest of nine categories) by two to one. And, now for the winners! The top ten game choices are: Zork I, II, and III, Ultima II, III, and IV, Flight Simulator II, King's Quest I and II, One

on One, Simmer Games I and II, Lode Runner, Hitchkiker's Guide Galaxy, Jet, Pac Man. Yeah, Pac Man!

US computer game players are hooked on flight programs. In addition to Simulator II, which can teach you how to really fly (and now offers nine extra Scenery disks of places to fly), there is Jet, Super Huey II, Infiltrator, A.C.E., Spitfire 40, Stunt Flyer, Ace of Aces, Dam Busters and five simulators of combat flying by Strategic Simulations, Inc. MicroPose, alone, offers AcroJet, F-15 Strike Eagle, Kennedy Approach (an air controller's traffic game), Solo Flight and Top Gunner.

All of the above are available for the C 64. VC20 owners can get it on the fun with MicroProse's *Top Gunner*.

The great news is Amiga's version of Flight Simulator II. Ben Dunnington, INFO magazine's publisher and editor, says, "BEGIN your (Amiga) game collection with this one!". He also gives his ***** (five star) rating to another new Amiga release Chessmaster 2000 by Electronic Arts/Software Toolworks. Although the 64 version of Chessmaster is just another good chess program, the Amiga version comes very close to real chess pieces (in your choice of wood or metal, 2D or 3D seen from the front or side) and more features than you've ever had from a live teacher. My favourite feature is the key you press when "the boss is coming"

Marble Madness, also Electronic Arts, for the Amiga is far superior to its C64 little brother. MC, who didn't care for it in her review in Your Commodore should try it on the office Amiga.

My "office Amiga" is now one month old. When I can escape from Chessmaster 2000 and Marble Madness, I am totally ensnared in the two programs which led me to purchase the Amiga. I find myself using both Aegis Images and Deluxe Paint II to work on the same graphic since they share IFF files. Deluxe Paint II is much the more powerful program, but Aegis' pattern making tricks are irrestible.

Add a Digi-View Video Digitizer from NewTek, used with a Panasonic CCTV camera model WV 1410, for visual input to the Amiga in IFF files, and you would get as excited as I am about the Amiga. Alas, both Aegis Images and Deluxe Paint II with their IFF files can only work with 32 colors produced by the Digi-View although Digi-View shows you their H.A.M. "hold-and-modify" mode to display 4096 colors at the same time on the screen. A new Digi-Paint software program will soon be available from NewTek to manipulate the 4096 mode in H.A.M. It will cost £59.95 and requires an update software version

The Amiga is getting a 1.2 Kickstart and Workbench update, but deliveries through local dealers has been delayed.

Scribbles! is the best of the presently available word processors for the Amiga. It was developed by Micro-Systems Software and is sold by Brown-Wagh Publishing. Version 2.0 is now out. Amiga WordPerfect is promised for this spring. This program for the IBM-PC is presently the hot word software with the Blue bunch. Let's hope it sells cheaper than \$495 in

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YOUR COMMODORE june 1987

its Amiga version for it sound like just what all US column writers need.

Your Superbase Personal has been written from the 64 to the Amiga and brought over here. It's said that you can file IFF graphics and CAD drawings to be used within text layouts. The same Progressive Peripherals and Software who handle Logistix, a project and time management type spreadsheet, sell the Superbase. Batteries included finally got their 128 Paperclip wordprocessor to the market place, RUN magazine said flatly, "...best professional word processor available." It has a built-in telecommunications system in addition to a spellcheck and dictionary. Cost is \$79.95. There is no sign of Paperclip Elite which will integrate text and graphics for the

However, it is Amiga software that is inundating the market. What a great answer to the old put down still being used by their competitors that there is more software for Atari's ST. More news on Commodore's good health is revealed for its market value, when this

was written, of 13.5 a share - up from last year's low of four.

Online communication seems to lend itself to gossip and rumors. Last months' chit-chat included talk of a production end for the C128 so more 64Cs could be made and of a reduced cost Amiga under \$500. Let's hope the C128 will hang in there. At least a third of the members of my local Commodore Club converted to the 128 within three months of its arrival on the market, and they are very satisfied with it. Still, if the Amiga could get down to \$500, with a disk dirve? Oh, heck, they'd change again!

Touchline

Spitfire 40, Gulf Strike: Avalon Hill Micro Games, 4517 Harford Road, Baltimore, MD 21214.

Stunt Flyer: Sierra On-Line, 48677 Victoria Lane, Oakhurst, CA 94644.

Ace of Aces, Dam Busters: Accolade Inc., 20833 Stevens Creek Blvd., Cupertino, CA 95014.

Acrojet, F-15 Strike Eagle, Kenned Approach, Solo Flight and Top Gunner MicroProse, 120 Lakefront Drive, Hun. Valley, MD 21030.

Chessmaster 2000, Marble Madness Deluxe Paint II: Electronic Arts, P.0 Box 7530 SanMateo, CA 94403.

Aegis Images: Aegis Development, 221 Wiltshire Blvd. Santa Monica, Cl 90403.

Digi-View Video Digitizer, DIGI PAINT: NewTek, Inc. 701 Jackson Topeka, KS, 66603.

Scribble: Brown-Wagh Publishing 16795 Lark Ave. Los Gatos, CA 9503

Family Computing: 730 Broadway New York, NY100003.

Flight Simulator II, Jet, Scenery Disk SubLogic Corp., 713 Edgebrook Driv Ghampaign, IL 61820.

Super Huey II: Cosmi Inc., 415 Figueroa, Wilmington, CA 90744.

Infiltrator: Mindscape, 3444 Dunde Road, Northbrook, IL 60062.

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PRINTER CONTROL MPS CONTROL SEIKOSHA CONTROL

The ultimate in utilities software for the Commodore 64 (or 128 in 64 mode). Versions available for 110 different types of printer (dot matrix and daisywheels). Each program tailored to the customer's printer. When you receive PRINTER CONTROL you never look at your printer manual again!

* * *** * * PRINTER CONTROL is the only word processing package in the world which will allow you to mix all the different sizes and styles of text available on your printer, and graphics, on the same line and still right justify the result!

And then it prints pictures!!!

Now in use in 17 countries with special language editions (including Hebrew).

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64 Source Generator

Ever wondered just how your favourite machine code program works? Now's your chance to find out with this powerful disassembler.

By Kevin Otton

good disassembler is one of the most important tools in a programmer's arsenal. By using such a utility to examine programs, he can find out just how a certain programmer manages to scroll the screen so smoothly, or simply learn to improve his own coding.

64 Source Generator is a disassembler that goes a step further than ,most programs of this type. It actually provides a file which can be assembled.

If you have never come across a disassembler before the operation of one is quite simple. You tell the disassembler which area of the computer's memory you wish to examine. The computer then prints to your screen or printer a list of all the machine code instructions that are to be found in the area of memory specified.

This is all well and good, but what if it were to come across an instruction such as JSR \$C010? With most disassemblers, it would take some time to find the actual location of \$SC01.

64 Source Generator improves on this by actually putting labels within the programs to where any instruction jumps. This makes it much easier when trying to follow instructions of any

The file that Source Generator creates in memory can be manipulated in the same way as Basic program; LOAD, SAVE etc. And can be assembled with any assembler program that uses a standard Basic file structure. The extremely popular MIKRO assembler being an example.

Getting It All In

The program is presented in two parts.

The first program, SOURCE GEN, is simply a small Basic program that is used to actually LOAD and RUN the Source Gen program. This program should be typed in and Saved on to cassette or disk for use later.

The second program, S-GEN M/C, is presented in a form suitable for use with our updated Hex Data Entrt II program. Read the instructions accompanying this program for detailed information on how to-use this program.

Once you have entered all of the S-GEN M/C program, save it out to your tape or disk. If you are using tape then the program should be SAVEd after the SOURCE GEN program.

Note: For your own programming safety make sure that you only use the new version of Hex Data Entry. Do not use the earlier version.

Using The Program

To use the program simply LOAD and RUN the SOURCE GEN program, this will automatically LOAD and RUN the program S-GEN M/C.

Once the program has started you will be presented with a choice of three numbers. These are options for the

Source Gen program to start in memory. The possible numbers are:

1 - 828(Cassette buffer) 2 - 704(Sprite Use) 3 - 49152(Free RAM)

Select whichever one of these you require. The numbers 828,704 and 49152 are the SYS numbers that you will need to activate the SOURCE program. The selection of the area to be used should be guided by where the program you are 'investigating' starts in memory, to avoid a clash with the generator.

Tape users should note that, as memory location 828 is the tape buffer, performing a SAVE or LOAD operation will corrupt the SOURCE-GEN program.

Once selection is made the program will be moved to the necessary area and you will be returned to Basic. Now type NEW to make sure that the memory is free for your disassembly. Typing SYS followed by the location of the SOURCE GEN program, e.g. SYS 49152, will cause the start up menu of the SOURCE GEN program to be presented. Most of the options available are self explanatory and a brief description of these should suffice.

F1) DISASSEMBLE

In order to disassemble, the program to be disassembled should have already been loaded into memory. If

necessary, the Move Basic option should be used before using this function.

You will be asked for a START ADDRESS, END ADDRESS, and a LINE NUMBER to start the disassembler working. If the line number is already in use the new program code will overwrite the original and following line numbers. Hitting RETURN with no line number entered will result in the computer working out the next line number +10 and adding it to the existing file.

RUN/STOP will abort the disassembly function but no error checking or correction takes place.

Extra long machine code programs may need disassembling in more than one part due to the limited memory available as the labels and source code are generated.

F2) RENUMBER

This is only suitable for use with

program created by the Source Generator as it only renumbers the lines and not any GOTOs or GOSUBs etc.

F3) DELETE

This will delete all lines from the first and last specified inclusive.

F4) APPEND

Use this option to add additional parts to the program already in memory. Disk users must enter a filename.

F5) START/END ADDRESS

For DISK USERS ONLY — This function displays the start and end address of the specified disk program.

F6) ALTER START OF BASIC

This function is extremely useful if there is a possibility that your machine code source file may overwrite your machine code being examined. For example if your machine code program starts at S0801, the same place where a Basic program usually starts, and it ends at S11E0, the source code generated would overwrite your machine code. In this case you could use this function to move the start of Basic to say \$2000 and you will suffer no such problems.

0PEA

BREA

BAEA

A3B0

A3C0

BJER

DOLEA

ABDE

A3E0

83EA

ABFO

ABFA

A400

A408

A410

A418

A420

85PA

0EPA

BEFA

A440

A448

A450

A458

A450

A468

A470

A480

A488

08PA

A498 A488 A488

AHEO

A4C8

AHDØ

AYDE

AHEO

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A4FØ

A4F8

A500

A508

A510

A518

A520

A528

A530

A538

A540

A548

A550

A558

A550

A558

A570

A580

A588

A590

A5A0

ASAB

ASBØ

ASB8

ASCO

ASC8

A5DØ

A508

ASEO

ASE8

ASFØ

ASF8

A500

F7) EXIT TO BASIC

This quite simply returns you to the Basic READY prompt where you can LIST, LOAD, SAVE etc. the source code you have generated.

Numeric Input

When a numeric input is required it can be entered in either decimal or hexadecimal format. For a hexadecimal number then you should prefix the number by a \$ sign e.g. \$C000.

PROGRAM: SOURCE GEN

4C 5 Q=PEEK(186)

13 10 IFF=0THENF=1:LOAD"S-GEN M /C", Q, 1

CF 20 POKE53281,6:POKE646,14:SY 549152

Use HEX DATA ENTRY II to enter this program.

PROGRAM: S-GEN M/C

4C A000 4C AF A0 4C 50 00 44 SG 02 EE 68 08 800B 20 54 : C7 : 37 A010 A0 A9 00 B5 FR A9 04 85 A018 FC AØ ØØ A9 2A 91 FB CB : 40 CØ 28 DØ F9 18 AS FB 69 A020 A028 28 85 FB AS FC 69 00 85 69 C9 FC 07 DØ 12 A5 FB CB 70 A030 A038 C0 D0 0C A9 2A A0 00 91 7A A040 FB CB CØ 58 DØ F9 50 AØ 31 848 00 A9 2A 91 FB AØ 27 91 90 A050 FR 4C 24 00 02 00 AD DA FC A058 A8 9D 00 D8 9D 00 D9 9D :82 AØ5Ø 00 DA 90 00 DB EB FØ 00 CP A068 D0 EC 60 20 09 A0 92 00 ØB A070 BD BB A6 90 51 Ø4 BD DD C9 90 A078 A6 79 Ø4 BD FF A6 9D FØ 04 AØ80 C9 BD 25 A7 90 19 05 90 69 05 AØ88 BD 48 A7 BD 71 22 000A A7 90 B9 05 BD 97 : 64 A098 09 06 BD BD A7 90 59 06 : 68 AØAØ BD A7 90 A9 ØB EB EØ : 55 E3 AØAB ØЗ 24 FØ 4C 70 AØ 60 A9 : BD A080 08 50 **89** ØE D2 02 20 7B AØB8 FF A9 00 85 90 20 6B AØ : DB FB 50 DØ : 25 AUCU E4 FØ 85 AØC8 ØЗ 4C FC AØ C9 89 DØ 03 : C2 40 ØB A1 C9 86 DØ 03 4C : 20 11 A1 C9 BA DØ Ø3 4C AGEO A1 C9 87 DO 03 4C 1D A1

AØE8 **C9** BB DØ 03 4C 53 : 40 A0F0 88 D0 CD 4C 29 A1 AS BE :51 AØF8 20 02 60 20 F6 AØ 20 A100 40 AC 20 44 E5 20 A2 : CA A108 4C AF AØ 20 F6 AØ 4C 4A : 04 F6 A110 A1 50 AØ 40 47 A2 20 : E7 A5 20 F6 AØ A118 F6 A0 4C 7A :CD 20 AA 20 F6 A0 4C 65 : 00 021A 4C 06 AØ 20 F6 4C :73 851A 05 PA AØ A130 E4 FF FØ 05 C9 03 C9 20 :52 FØ : B4 FØ ØB 60 20 E4 FB 8E1A 60 68 68 A140 E9 03 FØ 01 4C : 68 A8 PA. 85 26 PA. : 3E A148 AF AØ 20 . 79 85 27 BD 20 48 5B BD A150 20 A158 90 03 4C AF AØ 20 01 BB 40 SF A150 90 18 A5 48 AS 60 48 - B7 :02 A168 A9 59 85 26 A9 AB B5 27 A170 20 48 BD 20 SB BD 90 ØB - 30 A178 68 68 40 SA A1 4C AA A6 BF 90 FB AD 01 B1 A180 20 01 BB 30 88 B1 A188 5F AA 5F AB 58 85 62 A190 50 68 85 SF 98 AD 00 91 ØB 821A SF CB BA 91 SE C8 B1 SF A1A0 85 14 CB BI SF 85 15 A9 · 3D A2 B9 BE 00 ALAB ØØ 80 ØØ 02 : 20 A1BØ BC 95 A1 BE 01 BC 4C 45 74 A188 BA A5 28 85 51 AS 20 85 70 AICO 65 AØ 00 B1 61 CB 11 61 AF ALCH FØ 10 AD 00 B1 61 48 CB AB A1 DØ B1 51 85 53 68 85 51 40 87 AIDE C1 A1 AS. 61 18 69 OP. 85 72 A1EØ 20 AS 62 69 00 85 PE 40 E1 :16 A1E8 AF AØ PA 70 85 26 89 AB AIFO 85 27 20 48 BD 20 SB BD 19 01 A1FB BØ Ø6 20 BB 4C ØB 02 CF 0059 A5 28 85 5F A5 50 85 50 FA 805B AØ ØØ B1 5F CB 11 5F FØ 9F A210 20 AØ 90 ATI 4F 99 91 SF 9A A218 C8 AD 51 A9 91 SF 50 34 : 50 A220 62 AØ 00 B1 SE 48 CB **B1** :51 A228 SF 85 60 68 85 SF 4C ØB : 78 **SA 0ESA** 4C AF AØ AD 4F A9

A238 6D 52 A9 8D 4F A9 AD 51 30 A9 69 00 BD 51 A9 60 A9 65 045B 85 20 A248 98 25 AS AB 03 4C 64 48 BD 20 5B BD 90 A258 AF AØ AS 80 4F **A9** A5 E8 A260 15 80 51 A9 PA9 BF 25 AØ 895A BA AB. 85 27 20 48 BD 07 A270 5B BD BØ 03 A5 14 20 A9 BE A278 ØA 80 A9 40 EA 20 95 20 B9 A280 C4 A4 18 81 A4 90 03 885A 4C AF AØ A4 ØD DS FØ 06 20 85 82 90 085A A4 EE 4C A298 AP. A5 FD 80 A4 05 FF 05 DASA BD DØ 94 AD D3 AH BD CD A7 28 BASA A4 AD D4 A4 80 A4 AD A2B0 CD A4 38 E9 01 BD CD A4 1F AI 835A AD CE A4 E9 00 BD CE A4 56 50 C4 A4 18 20 81 A4 90 ARCG AF AD A4 25 A2C8 03 4C DØ ØB AD D4 A4 CD 82 CD A4 A200 B2 40 48 06 20 805A CE A4 FØ EE EA 01 BD 30 03 AD A2 AZEØ C3 ØD FØ CØ 00 B35A DS A4 06 44 85 14 AD D6 85 AZF0 05 AD D3 A4 85 FB 46 A2FB 15 00EA A4 85 FC AD 00 B1 FB BD 09 AD 07 ØD 08 15 80EA A4 A3 DIER FØ 05 20 FD EA 4C 18 20 28 80 00 BC 62 05 BIER 52 A4 A9 BD 01 45 BA E1 A9 EA BC 4C DSEA A5 18 69 01 85 FB 80 85EA FB FC B4 CD A4 A5 FC 69 00 85 DEEA A4 69 02 C4 BEER 8D CE A5 14 18 15 BB 15 69 85 DPEA B5 14 AS 00 DE 43 0S 84EA A4 1.8 20 81 A4 90 A350 03 40 97 EA AD пэ 94 CD A3 ØB AD AE A358 CD A4 no Π4 A4 CD Dø DAFA CE A4 FØ 05 20 EE B2 40 A368 4B A3 AD DS 94 Øn D6 64 nø EB AB 71 A370 FØ Ø3 40 7F AP. 20 A378 AD D3 A4 85 FB AD D4 94 AC A380 85 FC AØ ØØ B1 FB BD 119 D7

write your nined. For tine code the same am usually the source write your you could the start of will suffer

you to the re you can the source

required it decimal or a hexadecould prefix . \$C000. YG

9D 51 :3C 50 A9 : 62 27 20 34 E · 64 2A EE EB 85 26 : AØ 05 08 07 EC 49 - BE 91 20 95 E0 08 89 an ns · D2 4C B2 - 90 : 05 45 FE BD CD · 97 CA PP :28 :1F CD A4 OF A4 A1 98 PA :56 A4 CD PF : B2 A4 CD B2 4C 48 DA ED BC DA D 00 A4 B5 :F5 AD D4 46 FB BD TBD DB A4 16 18 A3 : 20 00 BC 62 45 BA : E1 FB 8D 85 FC : B4 50 88 88 : DE A4 CD EA: A4 CD AE B2 4C : 00 D6 A4 : DØ EA EB :70 D4 A4 : AC

BD D9 : D7

A608 85 2D 85 2F 85 31 A5 58 : 34 A890 0D 20 53 54 45 50 PD 00 - 90 A388 A4 AD D7 A4 0D D8 A4 F0 :EB A510 69 00 85 2E 85 APPA 93 11 10 :00 30 85 32 : AC 10 10 10 10 10 25 ED 43 4C 83: 05 EA AB A618 4C AF AØ AD ØA AB C9 ABAØ ØB : 37 10 10 10 1D 1D 10 A398 52 A4 A9 28 8D 00 BC A9 : FA FØ A520 11 A9 ØE 85 26 ABAB 45 PA AB : [1] 12 52 4E 55 40 42 ABAØ AB BD Ø1 BC 78 40 45 BA :40 A628 ABBØ 50 85 27 20 48 BD 20 52 52 54 HE ØD ØD ØD 85 5B - 91 A3A8 A5 01 29 FD 85 01 A0 01 : C5 **QE39** 7A A5 20 A888 ØD 20 4E 45 57 40 39 A6 4C 40 49 7A : C4 20 A380 B1 FD FØ Ø6 20 EE B2 4C : BS A638 A5 20 CC 05 G0 EV DZ ABCØ 4E 45 20 4E 55 40 42 45 :88 A388 80 A3 A0 01 A5 FB 91 FD BC A540 FF 20 DP FF A9 50 50 DS ABCB 52 20 EE 00 11 10 10 : 6E 10 A3CO CB A5 FC 91 FD CB A5 14 :CE A648 69 00 50 BD ABDØ 10 10 10 10 10 10 FF AS ØF A3C8 91 FD C8 AS 15 91 FD AS : DB :21 20 ABD8 A650 A2 08 A0 0F 20 BA FF 10 10 10 10 12 41 50 50 :13 A300 01 09 02 85 01 58 A0 00 :72 52 54 A658 CØ 92 ØF 20 C5 ABEØ 45 4E 44 20 AØ A308 B1 FB BD D9 A4 20 52 A4 : DC A550 00 20 CF C9 ØD FØ 07 : 00 ABEB 0D 0D 20 45 4E 54 45 A3EC 4C 9A A3 78 A5 01 29 FD : 6F A668 99 54 AB CB 4C AE A9 ABFØ 20 46 49 4C 45 4F 41 40 51 : 5E A3E8 85 01 A0 02 A5 14 91 FD . E7 A670 00 99 54 AB AD 54 AB C9 :98 ABFB 45 00 0D 0D 20 54 41 50 A3F0 CB A5 15 91 FD A5 01 09 : A3 A678 30 F0 03 4C 85 A6 AD : A1 A900 45 20 4F 55 52 20 44 49 53 A3F8 02 85 01 58 60 A9 4C AD - 29 A680 AB C9 30 FØ 23 A9 54 85 . 26 48 20 28 54 2F 44 29 00 ABOR 8400 00 02 AD D7 A4 BD 01 02 :00 A688 26 A9 AB B5 :78 27 20 48 BD A910 0D 0D 20 46 49 4C 45 20 9408 AF DB A4 20 07 AF AD FR · F2 A690 20 CC OF FF 92 20 C9 FF : 4F A918 4E 41 4D 45 20 4E 45 45 A410 B4 BD 02 02 AD B2 B4 BD : AD A698 A9 49 20 D2 FF : F1 99 13 20 44 02 34 64 02 44 54 44 026V 4418 03 02 AD 81 64 80 04 02 28 FF 9590 D2 FF 20 F.7 45 SR 05 : D4 A928 49 53 4B 20 4D 4F 44 45 4420 AS 20 BD 05 02 BD 09 02 : 68 A6A8 18 60 A9 6A 85 26 A9 A8 :7F A930 21 00 0D 0D 20 43 4F 4E SØ 30 08 SF 68 8559 PA 59 80 EB :19 ASEØ 85 27 PO 48 BD 20 5B AS A938 54 49 4E 55 45 20 59 PF A430 07 02 A9 54 BD 08 02 A9 CD 92 02 02 04 AT AT AT BEEN 20 : 3B A940 4E 00 0D 0D 0D 20 4C 49 DA SO AD DB PS BEPA 119 A4 20 BF A6C0 20 20 20 20 20 20 PO 20 :40 EZ 848A 54 20 54 4F 20 00 00 A440 C5 AD BE OB 02 BD 0C 02 :F1 : 30 A6C8 20 20 20 40 45 4E 55 20 A950 00 00 00 00 00 00 00 00 SO DO DE DO PA BEPA PA 85 12 A600 20 20 20 20 20 20 20 PO :50 A958 ØØ 00 00 00 00 00 00 00 8450 08 60 A9 42 BD 00 02 A9 35 92 02 02 02 02 02 02 02 00 50 50 :58 A950 00 00 00 00 00 A9 CF 85 2458 59 BD 01 02 A9 54 80 02 05 A6E0 20 20 20 20 20 A968 26 A9 **A9** 85 27 20 48 BD 20 50 20 : 60 45 68 50 E0 08 02 88 50 09 84 : 22 A970 20 58 BD 90 03 4C AF A0 DE DE 02 02 05 05 05 05 20 :79 8468 BD 04 02 AD D9 A4 20 **D4** ASFØ 2D 20 A978 C9 ØB 9Ø E7 C9 70 20 20 20 20 20 A5 15 A470 AD BE 05 02 BC 06 02 A9 :86 A6F8 20 20 20 20 20 20 20 20 :78 A980 F0 05 B0 E1 4C 8B A9 A5 A478 00 8D 07 2 A9 ØC 85 ØB : 3F 30 A700 20 20 31 3E 50 20 44 CE A988 14 DØ DA A5 14 85 28 A5 : 35 A480 60 78 A5 01 29 FD 85 01 :29 A708 49 53 41 53 53 45 4D 42 A990 15 85 2C A9 00 A8 91 2B : 6E 88PA A0 01 B1 FD D0 EØ 4C BB : 3F A710 40 45 20 54 4F 20 A998 18 69 92 40 45 . 24 CB 91 28 A5 2B A490 A4 BD D4 A4 BB B1 FD BD : 7B A718 4D 4F 52 59 2E 2E 2E 2E : 09 A9A0 B5 2D A5 2C 69 00 B5 2E 13 SQ OA PA ED BEPA FD BD 05 81 A720 46 31 20 20 20 20 20 20 : E8 BARA 20 BB 20 E7 FF A5 37 65 A4A0 A4 CB B1 FD BD D6 A4 CB :50 A728 3C 32 3E 20 20 44 45 4C :70 38 85 33 84 34 A5 2D A9BØ A4 A4A8 B1 FD 8D D7 A4 CB B1 FD FR A730 45 54 45 20 40 49 4E 45 : EB PA 888A SE 85 SE 84 30 85 31 4480 BD DB A4 A5 01 09 02 B5 : DE A738 53 2E 2E 2E 2E 2E 2E 2E : D5 32 20 E2 BB A2 19 B6 A9CØ 84 A488 01 58 60 A5 01 09 02 85 BE A740 2E 2E PE PF. 2E SE 46 32 : 80 ASCE 16 4C AF AØ 4C AF EE 0A :91 A4C0 01 58 38 60 A9 FA 85 FD :40 A748 20 20 20 20 20 20 33 30 :24 ASDØ ØD 1D 1D 1D 1D 1D 1D 1D A4C8 A9 FF 85 FE 60 00 00 00 D6 A750 3E 20 20 45 4E 52 55 40 : SE ASDB 10 40 4F 10 12 A4D0 00 00 00 00 00 00 00 00 : 00 A758 42 45 52 2E 2E 2E 2E :7E SE 53 54 41 52 54 20 4F 46 ASEØ A408 00 00 00 8E 0B AB SA 00 AS A760 SE SE SE SE SE SE SE 2E : DE ASEB 20 42 41 53 49 43 ØD ØD A4E0 A9 2E 20 D2 FF EB EC 0B : C4 A768 2E 2E SE. 2E 46 33 50 50 : 84 A9FØ ØD ØD 20 45 4E 54 45 52 AMEB AB DØ F7 PA 00 SA 90 : DE 45 20 42 A770 20 20 50 20 30 34 3E : C6 A9F8 20 56 41 4C 55 AMFO D2 FF EB EC OB AB DO F7 : B7 A778 20 41 50 50 45 4E 44 2E : C3 AAØØ 45 54 57 45 45 4E 20 24 A4F8 A9 00 BD 50 A9 20 E4 FF : 09 A780 SE SE SE SE 2E SE 2E 2E :F8 0E 80AA ЭØ 30 SD 54 37 30 38 ASOO FO FB C9 OD FO 2F C9 14 : 5E A788 2E 2E SE SE SE SE 35 SE AA10 30 0D 0D 0D 0D 20 4E :00 30 A508 FØ 2C C9 20 90 EF C9 5B EC A790 PE SE 46 34 20 20 20 20 : FC AA18 45 57 20 53 54 41 52 54 BF A510 B0 03 4C 1D A5 C9 CØ 9Ø : CD A798 20 20 30 35 3E 20 20 53 + EE 92 028B 41 44 44 52 45 53 53 A518 E4 C9 DB BØ EØ AE 50 : CB A7A0 54 41 52 54 20 41 44 44 : DE AA28 20 00 00 00 20 B7 FF PA A520 EC ØB A8 FØ D8 9D 53 A9 :40 A7AB 20 28 49 44 53 4B 29 2E : F8 AA30 BS BS 26 A9 AB BS 27 20 50 A9 A9 A528 20 D2 FF EE 00 : C6 A7EØ SE SE SE SE SE SE SE. SE :28 SA DE BP BEAA 10 20 DB A4 AD A530 B5 D4 4C FD A4 60 AD 50 : E4 A788 46 35 20 50 50 50 20 20 : 88 AA40 50 A9 D0 03 4C AF A0 18 A538 A9 FØ C2 CE 50 A9 PA9 90 :40 A7CØ 30 36 3E 50 50 41 4C 54 :70 A540 20 D2 FF A9 2E 20 D2 FF AA48 A9 01 85 B8 A9 08 85 BA :01 A7CB 45 52 20 53 54 41 52 54 :65 4548 AS SD 20 D2 FF AA50 A9 00 85 89 AD 50 A9 85 FD A4 4C AI A7DØ 20 45 45 20 42 53 41 49 : 30 AA58 B7 A9 53 85 BB A9 A9 B5 ASSO A9 10 85 26 A9 A9 85 27 : 5E 35 EF 807A SE SE SE SE 46 36 :40 **AA60** 20 20 39 A6 BØ A558 20 48 BD A9 32 85 26 EA 40 BC CØ FF A7EØ 50 50 20 20 20 20 30 : DC AA68 C3 A9 B5 B5 26 A9 AB B5 A560 A9 B5 27 20 48 BD 20 E4 : DE A7EB 3E 20 20 45 58 49 54 : 94 AA70 27 20 48 BD A2 01 20 C6 A568 FØ FB C9 59 FØ Ø9 :40 A7FØ 54 4F 20 42 41 53 49 : 98 :70 AA78 FF 20 CF FF BD C7 AB BD 4570 4E DØ F3 68 68 4C AF AØ A7FB 2E 2E SE SE SE SE :70 SE SE CF AAAA TA AB 85 14 20 FF BD 38 60 A9 CE 85 56 **A9** AB :F3 SE AB00 2E SE SE 46 37 20 20 AABB CB AB BD CB AB BS 15 20 AS80 B5 27 20 48 BD A2 10 20 : 00 AB08 20 01 08 00 00 00 0D 0D : 05 DEAR F7 BE A9 20 20 D2 FF 20 A588 DB A4 A9 FA 26 AS AB : EA AB10 50 54 41 50 45 20 4C 4F : 80 AASB D2 FF 95 54 50 DS AD A590 85 27 20 48 BD 20 E4 FF : 88 A818 41 44 20 45 52 52 4F 52 : 94 AAAØ CB AB 20 C5 AD BA 20 D2 : CC A598 FB C9 54 FØ A820 00 53 54 41 52 54 50 41 :40 AAAB FF 98 20 D2 FF AD C7 AB 45A0 D0 F3 AD 50 A9 F0 A9 A2 : 39 00 EC 00 02 PF PF BSBA 1D 1D : 34 C5 AD BA 20 D2 FF 98 AABØ 20 ASAB Ø8 4C 83 AS A9 00 20 D2 :00 AB30 10 10 10 10 10 10 1D 10 : 44 AAB8 20 D2 FF 20 CF FF 20 B7 ASB0 FF A2 01 BE 0A AB A0 00 : BØ 8E88 1.0 10 10 10 10 12 44 45 :5B A9 01 20 AACO FF DØ 14 AD CA AB 18 69 A588 BO FF AD 50 A9 20 54 4E A840 20 52 40 45 54 45 :6E ASCO A2 53 A0 05 PA BD FF 95 AAC8 01 BD CA AB AD CB AB 69 : BB 05 00 00 00 846V 44 45 4C 45 - 44 AADO OO BD CB AB 4C BB AA A9 ASC8 20 38 E9 02 AA AS 2E E9 : E2 A850 54 45 4F 4D 20 45 20 52 : F1 : 35 BUAR 73 BS 26 A9 AB BS 27 20 ASD0 00 AB A9 00 20 D5 FF BØ : 32 A858 00 0D 0D 0D 20 44 45 40 :48 CA AB A508 114 BA AS AAEØ 48 BD 20 D2 FF AE 20 :F1 A860 45 54 45 20 54 4F :FA 20 20 AAE8 86 14 AD CB AB 85 15 20 ASE0 38 E9 02 B5 57 98 F9 00 : AB 00 00 05 898A 0D 0D 20 · 7E 4E 4F AAFØ F7 BE A9 20 20 D2 FF 20 ASEB 58 AØ ØØ B1 57 CB 11 7C AB70 4C 49 45 20 20 20 20 - 80 A9 24 20 D2 FF ASF0 57 FØ 10 AØ ØØ B1 48 : 9E 4E AAFB DZ FF AD 57 A878 20 00 0D 0D 0D 20 45 58 : 97 CB AB 20 C5 AD BA 20 D2 ABØØ ASF8 C8 81 57 85 58 68 85 57 : BE ABBØ 49 53 54 49 4E 47 20 40 : FF AB08 FF 98 20 D2 FF AD CA AB AE00 4C EA A5 A5 57 18 69 02 :DS A688 49 4E 45 20 4E 4F 00 0D : 84 AB10 20 C5 AD BA 20 D2 FF 98

1D 1D : B4 : 02 : 02 : 90 : 50 :29 : 74 :03 : 77 :89 :FD : C7 :62 :7B : D7 :77 . 5C : 46 : 3E :50 58 :27 52 :50 :93 :16 : 3E · FB : 06 : E2 : E2 + D4 EA: :50 +7C : EE :33 : DA : B3 :73 :5B : C6 :14 :52 : 02 :98 :39 · E3 : A0 : 5A :81 :03 : EØ : 3F :51 : CE : 96 :33 : 05 :03 : 37 : D1 .63 +40 : A2 : C6 : SE

AD98 88 84 4C 45 BA A9 00 8D :83 50 DS : 34 AB18 20 D2 FF A9 ØD C9 B1 18 :89 4C ADAØ Ø8 Ø2 AØ ØD 01 :10 FF EA AB20 20 n2 FF 20 D2 AD 18 4C BC ADAR A5 FB 69 01 : E5 32 FF 40 AB2B 20 C3 FF 20 CC 18 : ED AD ADBØ BC A5 FB 69 02 4C 4F : B3 52 00 DERA 00 45 52 52 A5 FC : 7E FB A5 FR 69 EØ 85 :7E ADB8 44 44 20 41 DS OD EP RERA 20 4A : BE 48 4A ADCØ 69 00 85 FC 60 45 49 4E 40 OR40 PO 20 20 20 69 06 +14 02 ADCE 40 40 E9 ØA 90 C7 20 4C 05 BFBA 20 20 20 ØF :54 ADDØ 69 DE AA 68 29 00 00 00 00 45 4C ØD 00 **AB50** 69 ØB 69 ØE AB. 60 84 02 90 ADDB 00 00 00 58 ARSR 00 00 00 00 FØ ØЗ 4C 4A AD C4 AD BB **B**4 ADEQ 00 00 00 60 00 00 00 00 00 AB50 : BB CD 7C B4 FØ ØB BØ ADER A5 FC 00 00 68 00 00 00 AB58 00 00 00 05 SB 40 FE AD 40 CA AF 03 ADFØ OD OD OD 20 : BE 00 00 00 ØD AB70 : 02 FB BØ F6 20 E4 ADFB CD 7B B4 52 EE 44 AB78 45 4E 44 20 41 44 OF · BC C9 EQ DØ 03 CD FF AEØØ : 99 10 53 93 ØD ABB0 45 53 20 00 : DB BC B4 00 B1 FB AA BD AØ AFOR 10 10 90 10 10 10 10 10 AB88 10 :74 01 BD BC **B**5 BD BD 00 05 AE10 : 35 47 45 54 20 53 54 41 AB90 :33 BD Ø2 02 A9 BC B5 AF18 02 BD : 33 20 41 **AB98** 52 54 20 45 4F 44 BC **B7** BD : CD 02 BD AE20 20 BD 03 : CA ØD 52 45 53 53 ØD ABAØ 44 38 : 78 AE28 ØЭ 4C 7F B4 C9 ØØ DØ CF ABA8 00 00 20 46 49 40 45 4E B1 : FB 45 AE30 B1 C9 01 DØ 03 4C ØD : EB ØD ABBØ 40 45 PO 00 ØD 4C 52 B1 C9 :08 F9 02 DØ 03 **BE3A** ABB8 20 53 54 41 : F8 52 54 20 41 05 : BD B1 C9 AE40 04 DØ EØ 4C F.7 00 :27 52 45 53 53 00 ABCO 44 44 07 :63 DØ 82 C9 AE48 DØ EØ 4C 20 20 :81 ABC8 00 00 00 00 41 44 44 ØB DØ ØЗ :91 C9 AE50 03 4C AB BØ 4F 52 : DØ 4F 4B 20 46 ABDO 4C 4F 4C . 11 40 DA BI F9 09 DØ 03 ABD8 00 00 00 41 4F AE5B 44 44 4E 62 C9 85 : CD AEGØ SE B1 ØD DØ FD 40 : 02 46 4E 1414 00 00 00 ABEØ 20 :48 C9 03 DØ EQ 4C **B3 B3** AE58 B1 00 00 00 00 00 00 00 - F8 ABER 00 ØA DØ Ø3 4C 7F **B3** C9 : 66 AE7Ø C9 00 00 00 00 - FØ 00 00 AE78 ØB DØ ØЗ 4C 94 ВЭ F9 OF - 51 00 00 00 00 00 : F8 ABFB 00 00 00 : 40 03 40 DØ AE C9 ØB DØ AE80 DØ FF FF : 02 FF AC00 25 FF B2 C9 ØF nø C1 : D4 AE88 03 4C 50 FF FF FF FF : E4 FF FF ACØ8 70 B4 85 14 . 75 AE90 4C 73 B1 AD : EC FF FF FF FF FF AC10 - 09 85 ra FF nø AE98 AD 7E B4 15 FF FF FF : F4 AC18 FF FF B4 C9 FA BØ 12 : 71 AEA0 07 AD 70 00 00 00 00 00 20 00 00 00 AC20 · D7 69 OA BII 70 AEA8 AD 70 **B**4 18 00 00 :28 00 00 00 00 00 00 BS2A AD 7E B4 69 00 AD 7E : EØ AEBØ **B**4 00 · 30 00 00 **0E3A 69** DB A5 PE - 28 AEBB **B4** 50 68 68 00 00 00 00 AC38 00 00 00 00 : 38 : DF BD 4C : A0 AECØ A9 BB 85 27 20 48 09 BB 85 27 AC40 85 26 EØ AD 4C 00 AØ : 46 AECB 32 BA 4C · EC 20 48 BD 20 5B BD 90 EQ. AC48 AEDØ 8D 78 B4 CA . 2F : 6F AØ 01 B1 FB 79 B4 CA AE A5 14 BD 28 BD FC AED8 B1 FB BD **B**4 PA. ACS8 85 FB A5 15.8D 70 B4 85 : C7 24 80 05 02 AD · CB 04 02 A9 AEEØ 25 69 RB 85 : E6 AC50 **A9** CØ 85 **B**4 20 CS AD BE 06 02 2A AEEB 48 BD 20 5B **AC68** 27 50 RD 90 - ØB BC CS · DC 07 02 AD 78 B4 20 : 55 AEFØ **A4** 15 AC70 03 4C 40 AC A6 14 02 99 29 ØB 02 BC 09 BE 7C B4 78 A5 - 50 AEFB AD AC78 BE 7B B4 BC ØA 02 4C A7 ВЗ FB : 74 29 BD ACB0 29 FD 85 01 PA 00 BU . 41 AFOO BD B4 BD 82 : 50 81 AFØ8 PA9 00 FB BD FC FF : 38 AC88 FF BD FF : 59 AF10 FØ 15 CA 18 AD B1 EØ 00 FE FF BD FF : ØB AC90 FF 80 AF18 69 81 **B**4 AD 82 :50 B4 A5 01 99 02 85 01 58 . F7 AC98 : 30 AF20 B4 69 00 BD 82 **B4** 4C 10 · F7 B4 FØ 05 ACA@ AD B4 CD 7.0 DB AD 82 **B4** 09 30 BD 08 BS7A AF AC AD 7B B4 : EB ACAB BØ 36 4C B7 29 FØ **ØE**TA 83 B4 AD 81 B4 4A :80 29 A9 · DC 79 **B4** 02 BØ ACB0 CD 4A 09 3Ø BD 82 **B4** 84 AF38 4A HA 20 :92 A9 88 85 27 F3 85 26 ACBB 29 OF 09 DE 80 : E8 81 **B4** 75 AF40 AD 85 26 BA9 B9 A9 05 48 BD ACCO 28 85 : A9 60 A5 61 AF48 81 B4 20 48 BD 20 E4 : CØ 85 27 ACCB. 00 85 39 85 : 25 AF50 85 62 A9 20 4C 40 : AB 03 59 DØ ACDØ FØ FB C9 61 : AA CB 11 AF5B AF AD 00 B1 61 AE : AE 4C CA DØ FØ ACDB AC. C9 4E 39 : 94 FØ 85 02 B1 61 AFE@ 18 AØ AD BD : B5 BC EA ACEØ AS EØ 80 00 00 B1 : 33 AF68 C8 B1 61 85 3A AØ PA 89 : 94 26 ACFR 01 BC EA. 15 85 : 6E 51 85 62 68 : 19 AF70 51 48 CB B1 SB BD 48 BD 20 ACFØ BS. 27 20 18 A5 39 :40 AF78 85 61 4C 59 AF 4C ØA AD :01 48 AF ACFB 90 Ø5 20 AE 70 B4 AS 69 : 08 AFB0 69 ØA BD 15 BD A5 ADOO A5 14 80 70 B4 AD 60 444 E5 **A9** 85 E1 AF88 DO BD 7E B4 50 7E B4 50 ADDE 03 : SE B4 90 F7 FØ 7A AF90 B4 CD **B**5 AØ 00 B1 EE FE AS 6B AD10 : E2 CD 79 78 **B4** AF AD C8 4C : 52 AF98 40 A5 FD FØ 07 99 00 50 AD18 **B**4 :F1 AD EB 99 00 02 CB CB CB CE AFAØ **B4** FØ 02 90 9050 DE BØ 40 05 **ADZB** 61 AFAB CD 7C B4 FØ CB CB ØB AD 7A B4 20 :00 7B **B4** CD 99 AFBØ BC AF AD 78 84 BE 02 BC ØB 02 DECIA AD 68 78 AS. : 0A AD38 79 B4 20 C5 AD BE 07 74 AFBB BØ D3 FØ n1 68 AD FA A9 85 :17 01 AFC@ 01 29 FD 85 ØB 02 20 93 AE 40 AE AD40 02 BC :60 B1 AFCB FD A9 FF 85 FE AØ 01 AD BA BY 85 14 AD : C5 45 BA AD48 ØB : 80 00 : 18 AFDØ FD FØ 10 CD 77 84 FØ B4 85 15 AD50 **B**7 AFD8 50 EE 82 4C CD AF 88 B1 : 75 20 01 BB AD 88 84 80 : GE AD58 02 : C5 78 B4 DØ ED 40 5C 89 07 AF : 80 AFEØ FD CD 02 AE ADSØ 01 :70 20 EE RP 4C CD AF AØ 83 B4 BD 50 02 AD 88 40 AFEB BØ AD AD58 :25 CB AD AD 78 **B4** 91 FD 03 **B4** 80 000 AFFØ 00 **AD70 B4** 80 : E4 : E8 AFF8 77 B4 91 FD CB A9 00 91 AD78 04 02 A9 20 80 05 02 AØ :60 70 BØ 20 : 96 ROOO FD CB 91 FD CB ADBO 04 B1 5F FØ 07 99 02 02 AD 75 B4 : EB EA 8008 4C 8D 014 02 AD 99 95 95 98 : F6 ADB8 C8 4C 81 75 B010 91 FD 8D 05 02 AD B4 : 48 BD :38 AD90 18 69 07 85 08 A9 00

18 B018 CB 91 FD 8D 84 B4 20 9298 07 20 AF B3 AD 84 B4 AA BØ20 BEAD AD 83 BØ28 B4 AU. 05 92 AD 82 BASI **B1** 84 BD BØ3Ø **B4** BD 07 02 AD BBB 09 02 85 011 3288 BØ38 ØB 02 A5 01 BØ4Ø 58 AD 7F **B4** F9 ØA DØ 03 200 C9 ØB DØ Ø3 4C BØ48 4C 87 B3 FB DØ ED 4C BC BØ5Ø 90 **B3** 09 BEDØ BØ58 B3 4C 94 82 AØ Ø4 R1 FD 02 PA 4C BD BØ6Ø FØ 80 05 BEEØ 02 FD 4C 24 BØ BSEB BØ68 04 CB B1 ED EE 75 **R4** BØ70 EE 75 **B**4 DØ B2FØ AØ 02 BØ78 60 PA 01 80 8B B4 BEFB B1 FD 8080 B1 FD BD BA **B4** CB 8300 20 70 BØ 49 BØ88 BD 87 B4 CB 8308 75 84 BD BØ90 BD 04 02 AD 8310 4C B4 91 CB BØ98 05 02 80 88 FD 8318 BD 89 84 BOAD AD 76 **B**4 91 FD 8320 F3 BØ AD 00 BOAR 4C 24 BØ 20 **B358** 2R R9 09 FF BØBØ B1 FB AA BD B330 DØ Ø3 4C 2E B1 92 20 BE BØBB 8338 02 BE ED 02 BØCØ 07 02 BE 09 **B340** BE 00 02 A2 59 BE 8348 BØCB A2 42 54 BE 02 02 AØ 8350 BØDØ 01 02 A2 08 02 BD 0A 02 BA B BODE 21 BC B358 BØEØ 00 80 ØB 02 PA ØB BD 00 8360 AØ FB BC 01 10 BØE8 BC A9 B1 BD 8368 AP. E6 B1 AØ 00 B1 BØFØ 4C B370 BE BØF8 24 BE 04 92 20 CS AD B378 BC 06 MP 99 00 80 B100 05 02 8380 02 60 A5 FC CD 70 **B**4 B108 07 **B388** B110 FØ 08 BØ ØЗ 4C 21 B1 40 B390 FB CD **7B B4** BØ B11B CA AE AS. 8398 C9 PR no 03 B120 FB 20 E4 FF DAE B128 4C CD AE 4C AB RO PA EØ 01 BC BD BC 89 AD BD B130 00 BBBØ B138 4C EØ AD 99 00 80 04 02 8388 **B**4 SB B140 AØ 09 44C EB B1 20 BBCØ OC 4C 07 OB B148 AS 00 8D 02 **B3C8** 04 02 A9 BD B150 C9 B1 EA 23 BBDØ FB B1 B158 24 80 05 02 AD 01 8308 07 BC CS 20 OT BE ØB 02 8160 B3EØ PA 50 ØØ 8D 0B 05 AØ ØD B168 FB C9 C9 B1 AØ 01 B1 B170 4C A2 B178 A9 DØ Ø3 4C 89 B1 C9 89 B1 F9 AD DØ B180 DØ ØЗ 4C A9 BD 00 02 P.A 59 B188 12 42 02 01 02 A9 54 BD 92 B190 BD AB BØ 40 B3 B3 PØ 58 B198 40 8418 58 BD 07 OP PA. BIAG **B**4 BA 20 **8420** B1A8 8D 98 02 A9 00 BD Ø9 02 8428 **B**4 B1BØ AØ ØE 4C **C9 B1** 20 58 BHBO 80 07 02 29 59 80 B1B8 A9 SC **B438** 00 BD 09 02 AØ B1C0 ØB 02 A9 B440 C2 B1C8 ØE 84 ØB 50 B2 20 93 **B448** 20 AF ΔD 40 20 D4 ВЭ BIDØ AE 04 02 09 45 BA PA9 41 an B1D8 **E458** ØB BD 05 02 AØ ØA 84 00 B1EØ B2 20 93 AE 20 D4 C2 20 B1EB A7 AD 40 45 BA PA S **B3** 20 BIFØ B470 04 92 EA. 24 80 05 BD B1FB 28 20 CS 01 B1 FB B200 02 AØ B480 PA 06 02 BC 02 20 BE B2ØB 02 BA. 58 80 09 02 BD ØB B210 B490 ØA 92 4C 46 82 B218 A9 29 BD **B498** 04 02 PA 9 80 28 BD A9 B220 BYAG 01 B1 FB 20 C'S B228 Ø5 Ø2 AØ BHAB Ø2 ØB 02 BC 07 BP30 AD BE B4BØ 92 PA 20 BD 09 29 80 ØB B238 **B4B8** 02 A9 00 BD ØA B240 02 69 59 B4C0 10 45 C9 **B1** R248 80 ØB 02 AØ 85 84 80 B250 A5 FB 18 69 02 BADO **B**4 AØ 00 BD 85 RACH 05 FC 69 BADB 85 B250 01 R1 FR SE 39 18 60 69 AD 86 B4 BH B268 B4 BD 78 B4EB BE AF A9 77 20 B270 00 BD **B4** BHFO 20 **B4** B278 24 HI1 014 02 AD BHFB 02 02 BC ØB B280 C5 AD HE 05 B500

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80 08 00 8A 50 80 08 50 00 8D

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AD 78 B4 20

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BS18 53 53.53 42 42 53 42 42 B798 07 03 03 07 06 05 07 07 : 6F 20 1B B1 :20 B298 02 A0 0E 4C C9 B1 8D 84 :42 07 00 ØB Ø7 07 . 98 AF 44 B7AØ 09 09 07 53 54 42 : 00 BRAD BY 38 A9 00 ED BY BY BD : CC BS20 53 53 53 42 54 AD 82 20 BZAB ØA 07 EQ 04 07 07 : 80 4C 42 BS2B 53 423 42 40 4E - 46 38 94 42 01 07 00 02 OH 07 4E B7B0 01 54 42 84 AD 86 **B**4 : 6F B530 4C 40 4C 42 54 4C : CB B280 84 8D 78 E9 85 01 : 18 : 24 03 03 07 05 07 07 95 B788 ØE 40 B538 4C 4C 4C 42 42 4C 42 42 FB 8888 00 BD 84 20 BE AF B7CØ 09 07 ØB 07 07 BB 07 83 29 FD B5 : A5 B540 4C 4C 4C 42 43 4C 54 42 77 B2 78 A5 01 07 07 03 68 **B7CB** 07 ØA ØA 07 00 04 9E 43 43 42 42 : 07 RECR 01 AS FA BS 09 85 . 25 RS4B HE 4C HC 42 FD ØB 07 74 B7DØ 07 01 01 07 00 OP **EP EP** B2D0 FE A0 01 B1 FD FØ 25 C5 :91 B550 43 43 44 42 44 42 : 08 B1 8708 ØЗ Ø3 Ø3 07 05 05 07 07 AR 42 42 43 42 412 AF RPDR FC FØ Ø6 20 EE B2 4C D1 : B4 B558 43 43 44 07 07 DB 42 B7EØ 07 09 09 07 00 ØB 40 · 00 보크 시시 42 43 43 42 : BB BPF0 BP BB B1 FIL CS FB FØ 43 B550 42 07 07 07 BE 24 : C1 43 42 E5: B7EB 07 ØA ØA 00 04 43 44 42 53 42 RPFR PØ FF RP 40 111 H2 SH AS - 1B 42 07 92 MA 0.7 94 B4 42 B2FØ 01 01 00 75 : 10 B570 43 53 49 42 49 4E : CD 53 B2F0 FD E9 06 B5 FD A5 FE F9 FE 07 D4 : CØ B7F8 ØC Ø3 03 07 ØB 05 07 AØ 02 42 53 42 42 . 5E BREA OO BS FE 50 AØ 00 A5 FB **BS7B** 43 53 49 42 07 BB00 07 09 09 07 00 ØB 07 FB B1 FD EI , F4 8300 91 FD CB A5 FC 91 FD CB 8580 42 53 49 42 53 53 42 42 : BA 07 07 01 PA 8808 07 ØA ØA 07 07 04 BO : B7 70 B4 91 FIL CB AD 7F : 58 8588 42 53 49 42 52 52 59 59 +10 BBOB AD 94 01 01 07 00 07 00 07 84 BD 70 B810 01 B310 B4 91 FD CB A9 00 91 FD . 20 B590 59 52 53 59 48 52 53 59 - 4B FD : 70 03 07 ØB 05 07 07 EB CB 03 03 B318 C8 91 B818 FD 20 FF 82 AØ 00 : AE B598 59 52 53 59 50 52 59 59 - 65 89 ØD 07 00 ØB :40 8820 09 09 8320 98 91 FD CB CØ Ø5 DØ F9 59 52 53 59 40 52 59 : 99 BSA0 59 AØ 00 : ØB 07 07 02 04 02 07 AC 07 ØA 83 AØ 02 AD 70 **B**4 : 10 52 53 59 53 4E 59 59 8888 B358 4C 76 BSA8 59 00 07 96 01 07 00 02 :54 01 8330 91 FD C8 AD 7F B4 91 FD B5B0 49 4E 4F 59 4C 4E 4F 59 :27 BB30 01 20 : BB : F1 03 07 05 07 07 ØB ØB 8338 AØ 12 B9 FF 01 99 05 50 59 59 70 ED BERR ED 8588 49 4E 4F 59 4D 4E 03 00 07 18 . Bc 00 07 00 ØB 8340 88 C0 00 D0 FS AD 04 B1 BSCØ 59 4E 4F 59 45 4E 59 59 FA RAHO 09 09 59 : 40 ØB Ø7 07 07 SE 8348 FD 8D 01 02 CB B1 04 02 FD AA : B3 BSC8 59 HE 4F 59 54 4F 59 59 : 03 BB48 ØA ØA 02 : EB 07 00 02 00 BE : 09 01 01 01 8350 20 07 AF A9 4C BD 00 02 BSDØ 59 4F 53 59 48 4F 53 59 :73 BB50 03 07 50 : 84 05 07 07 28 OB 50 08 P8 E8 0A 82E8 02 AD 92 + 30 B508 40 4F 53 59 55 4F 59 59 + DF 8858 EQ 03 BD : 80 07 27 5B 00 OB 09 09 07 8360 B4 BD 03 02 AD B1 **R4** BD FF BSEØ 59 4F 53 59 4C 4F 59 59 + C1 RREØ 0.7 10 : BA 07 ØA ØA Ø7 02 04 07 07 48 08 05 69 20 40 89E8 05 02 18 . 98 53 59 54 44 59 59 : AF 8868 BSEB 59 4F FB AE 07 00 02 DB : E4 01 8370 AS ØB 69 Ø6 85 ØB A5 01 59 44 4F 59 40 44 4F 59 + 27 BB70 01 01 B5FØ AD BE : B5 03 07 05 07 07 48 06 8978 09 02 BS 01 58 50 20 20 . 40 BSFB 40 44 4F 59 56 44 59 59 · 98 BB7B 03 ED 00 80 50 7 E :50 ØB 07 07 B4 09 09 07 00 8380 B4 20 BE AF AE 05 PA :00 59 44 59 45 44 59 59 BBBØ Ø7 B600 4F 7C **B**4 85 0A 07 10 07 10 05 58 DA : 79 59 59 54 59 59 .26 BBBB MA 93 11 8388 BD 09 02 A9 BD 8608 59 44 4F B1 40 10 10 10 :73 10 10 10 B4 : ØB BB9Ø 10 8390 02 4C A7 B3 20 2A 20 54 59 45 59 58 59 B610 54 54 F3 84 BØ 68 49 53 41 53 **B898** 1D 10 12 44 8398 BE AF 20 PA 20 BD : E2 59 FP AE **B**4 B618 54 54 43 54 59 59 De 45 20 FE :61 42 4C 83A0 09 02 A9 59 80 0A 02 : 5F 54 59 59 54 58 59 BBAØ 53 45 40 A9 B620 54 54 AB 11 20 44 : 30 4E ØD BBAB 54 11 BBAB ØØ BD ØB 02 10 85 OR : 93 59 59 44 44 44 59 :28 PA 8628 59 54 01 28 : 79 : 98 BBBØ 53 41 53 53 45 40 42 8380 4C C5 B3 20 2A B4 20 BE 44 44 44 59 41 44 41 59 8630 69 04 02 46 52 4F 40 20 00 90 45 20 B4 89 00 BD 09 : 95 59 43 44 59 59 . 52 BBBB 8388 AF 20 3A 8638 44 44 44 58 **B**4 AB 10 :50 10 10 10 10 BBCØ ØD ØD ØD 83C0 02 A9 0E 85 0B 20 CZ 82 : 27 44 59 40 44 53 59 B640 44 44 ØC 40 3E 10 10 10 10 10 10 83 20 : 86 119 BBCB 10 10 B3CB 20 93 AE 20 134 B7 8648 44 44 44 59 50 40 59 59 MP 69 31 20 00 93 10 BBDØ 10 10 54 4F **B3** :20 40 45 59 8300 AD 4C 45 BA 20 FA 20 B650 50 40 45 59 4E :60 B1 82 FB 49 4E 45 : 46 20 40 1.0 11 11 BE BA 20 20 SD FF AØ : 48 8658 50 40 45 59 4E 4D 59 59 :00 BC 037 20 4E 55 4D 42 45 52 20 : F5 :73 BBFO 83E0 00 B4 FD A0 02 84 FE AØ 59 40 45 59 4C 4D 59 59 : 07 B66Ø · EC AØ ØD 49 47 48 20 : 69 PO DP : 96 59 50 42 59 BBEB 54 4F 20 48 FD 83E8 ØØ B1 FØ 037 8668 59 40 45 FB C9 31 . 9F BBFØ ØD ØD ØØ ØD ØD 20 45 4E **CB 4C** E9 83 EA ØD 20 02 : E2 B670 50 42 4E 59 4E 42 4F 59 : 95 50 C9 AP 20 41 44 44 20 54 4F . 27 DZ PA : FF 59 BBFB 44 83F8 FF 60 A9 20 20 59 42 59 : B6 B678 50 42 4E 45 AØ 69 24 20 :40 45 42 59 59 : C7 B900 20 4C 4F 57 00 0D 0D 20 AA SØ 38 08 EG 0078 A9 DP 42 4E 59 59 B680 A9 : 59 B908 43 4F 4E 54 49 4E 55 45 DF 20 FB : EE 54 :90 BHOR FF 1F **B**4 A5 59 48 41 54 95 FC 8688 59 42 4E 09 02 02 : 42 50 B910 20 59 2F 4E 00 OF OF OF BB 1E 84 A9 20 20 D2 54 41 4C 54 : 64 B410 41 4C B690 54 50 58 : CB BØ 8418 80 20 B698 41 4C : 90 B918 20 53 54 41 52 54 50 4C EC 55 40 42 : 03 98 : 84 54 8920 49 4E 45 20 4E SO OS AB DA OSPB FF 50 DZ BEAD 54 41 40 54 43 41 54 : BB : 80 50 60 : BD 54 54 RSPA 45 52 00 PA PA 3F 3F ЭF B6 B428 FF 50 A0 01 B1 FB BD 78 **B**6A8 54 41 4C 54 52 44 : DØ 58 **B**4 B1 AS 3F PA 98 : 90 PAS 3F B430 B4 CB B1 FB BD B4 E1 : 72 B6B0 54 44 40'54 50 44 40 54 DEPR PA 3F 3F 59 : 53 3F AS 24 20 2A · B3 B938 2A 2A ЭF : B9 8438 FB A9 24 80 04 02 AU : CD BBBB 54 44 4C 54 49 44 54 54 02 : CC 3F 2A 77 B4 20 :7B B940 F 3F 3F 3F 3F 3F B440 CS AD BE 05 ØB BECØ 54 44 4C 54 43 44 54 54 : A3 20 93 : ED FS 24 4A 21 22 8948 PA 20 **B448 8C** AD 78 20 32 44 4C 54 49 52 54 54 20 PA **B6C8** 54 AD - DB : 20 4C PR PC B950 25 26 27 28 29 24 B450 AD BE 07 02 BC 50 80 60 :30 54 52 54 41 52 52 54 :10 BEDØ 52 02 : BF A9 54 52 B958 20 PE 2F DE 31 32 33 34 E458 A9 24 BD 50 40 AØ 01 B1 :59 52 54 43 54 54 : 39 50 52 BEDB : 61 84 ØB · 70 B960 35 36 37 SH 39 AF 3B 30 8460 FB 20 C5 AD BE 05 02 BC - F0 49 52 54 54 :63 52 54 54 52 BEEØ . 95 . 04 20 D4 B968 30 F F 40 14.1 42 43 44 8488 06 02 60 AC B2 20 24 : ØE 54 52 52 54 53 43 54 54 : 43 50 BEER : 04 BA A9 B970 45 46 47 48 49 4A 4B 4C : CC 41 43 54 : C5 00 00 : 36 54 52 8470 20 20 20 20 00 41 54 43 BEFØ 52 : 75 54 . 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A5 BFAØ 05 BØ ØF BF 20 :51 :27 BD20 53 53 20 41 4E 59 48 BAAØ 85 58 A4 2E 84 SB 90 01 BFAB C9 ØA FØ 05 BØ Ø3 40 BE BD28 45 59 20 54 4F 20 43 4F : 67 20 BB A5 : 67 BAAB CB 84 59 73 BFBØ BF 38 AD BE C9 00 ØD : E8 15 BD FE 01 BC FF 01 : 6B BD30 4E 54 49 4E 55 45 BABØ A4 BFBB 80 F4 BE AD F3 BE E9 00 54 20 4F 46 :83 BD38 ØD 20 4F 55 32 85 BABB 31 A4 BE 90 BFCØ BD F3 59 00 *E3 BD40 20 40 45 40 4F 52 ØB 88 B9 FC 01 91 5F : D7 BACØ FØ 07 AD F4 BE 20 112 : 00 BFCB BF FB 20 30 BB BD48 A0 00 B1 56 BAC8 88 10 4A BD A9 20 : 72 BF A2 00 BD 50 BFDØ FE : 22 BDSØ FF CB 4C BADØ BA 4C FF BB A5 28 A4 20 10 EA. 50 50 DZ FF 30 DØ 8058 02 FF FØ 95 00 A9 2E 20 :00 BFDB BADE 25 84 23 18 AØ 01 B1 : 80 DØ EF 4C . 39 BFEØ EB EØ 64 BAEØ FØ 10 AD 04 CB B1 22 : 64 BD60 D2 FF E8 EØ Ø5 DØ FR AZ BF 20 Da FF E8 : 70 BFEB FA : D1 00 PA 90 50 DS FF ER EØ BD BAEB 98 22 AA AØ BD68 BF DØ F5 BD FA 23 00 CB :71 DØ 00 PA 58 00 911 :55 BFFØ 04 BAFØ ØØ 91 22 A5 69 BD70 05 FB 33 39 30 0E 30 BFFB FF 30 BAFB 22 85 23 90 DD :24 BD78 EC BE EB FØ 07 DØ FA 20 + F.3 50 :BE AS CØ 85 85 FB AØ 01 85 BDBØ E4 FF FØ FB C9 ØD FØ 73 :81 C000 BA: C9 BBØØ 50 A5 28 A6 50 FB FØ Ø7 50 DS : EB C9 TO OF : 2E C008 90 00 B1 BBØB 50 B1 5F FØ 1F CB BD88 C9 FØ 3E 24 5F 86 0A E0 20 E4 FF AE FP BE EØ ØØ DØ FR 92 . 24 C010 FF CH 45 BB10 CB AS 15 D1 SE 90 18 FØ : 08 BD90 CØ18 FØ ØB C9 32 40 87 BD C9 89 FO FB C9 31 DØ 09 A5 88 : BØ BD98 01 BE F1 BE BB18 03 88 DØ EF 4C DC C9 30 BØ 03 4C - 5F C050 FØ 20 C9 33 B820 SF ØC FØ ØA 88 B1 SF : B4 BDAØ 30 90 90 BD B1 CØ 90 AR 00 C058 CØ BD AF FI BE FØ DØ. 09 : F5 88 B1 SF BØ D7 18 :93 BDAB **B7** B828 99 EB 18 DØ 69 CØ3Ø 02 EØ : ØA BDBØ 41 90 CC C9 47 BØ CB AF +04 20 55 BB AS 00 DØ 50 20 BB30 07 AØ PA 05 FØ qn. EC : BB DØ3B BD A5 37 A4 38 85 33 : A7 BDBB FZ BE EØ CI BB38 35 C1 FØ 00 BD : 14 CØ40 D2 FF EE FP BE 40 SA BB40 B4 34 A5 2D A4 SE 85 2F : 38 BDC0 BE 20 4C 42 CØ4B DP. FF EB FØ 00 nø - 05 84 **SE** 20 : 2F BDC8 BD AE FP BE 30 85 31 8848 84 03 EB :89 CØ 90 30 4C CØ50 RD R1 16 68 AB 68 :68 BDDØ 08 AZ 00 BE F1 BE 7F 19 86 BB50 BB A2 07 DB ED 00 PA AE FP : 9E COSE 18 DØ FS 48 A9 00 :23 BDD8 BD F2 BE A9 48 98 BBSB AZ FA BA. :78 02 A9 48 BD ØB AØ 00 A9 9D 50 : FF CØBØ A2 28 BDEØ BE 90 EC BE A5 REGO 85 E 85 10 60 18 D2 FF 20 2E 20 DS A9 90 DE C068 53 C1 FØ 20 BDE8 A9 69 FF : 5E 8868 69 FF BS. ZA A5 2C 00 BD 02 B1 CØ70 4E 57 CO : 81 BDFØ 20 05 AE F2 DØ 87 : 7F 31 BB7Ø 85 7B 50 20 BS BB 85 EB EØ 18 DØ BE CØ78 90 00 CO D1 BD AD FØ 07 : A5 :70 EC 8878 84 32 38 A5 5A E5 SF 85 BDFB 4C 38 :67 CØBØ PA CØ 8D 07 AØ AS ØC 40 66 BE : ED C9 05 BB 55 0888 A5 SB E5 60 AA EB REGO 24 DØ 00 71 FØ BD C1 CORR OB AØ SA : EF 86 134 86 E5 : 62 BEØ8 60 5A 00 BBBB 98 FØ 23 AS. SA 38 55 5B DP FF ER 4C BC C090 07 20 A5 : 95 50 50 BE :18 03 CE 38 00 BD EC BE BB90 B5 5A BØ BE10 77 : 96 CØ98 PA 4E 80 PA 50 45 BØ ØB CB 4C 64 BB98 58 E5 22 85 58 BE DØ BE18 EC F2 : B9 18 E9 07 : 67 CØAØ 7B Ø2 PA 57 BD 79 02 5A 91 58 88 BE20 PF 85 A5 15 85 04 BI BBA0 59 90 C9 COAB ØD BD 70 OP. PA 04 85 : 00 BESB 19 BØ 21 A5 ØA : 46 91 58 C6 58 55 BBA8 DØ F9 B1 5A F2 34 90 :04 58 55 ØA. 26 55 65 14 85 : 00 CØBØ 60 78 AS 01 29 FE AS. 01.5 DØ C4 BE30 BBBØ CG 59 CA 78 CØBB 58 40 00 AC 00 AS 01 14 A5 22 85 15 : DA 33 90 22 48 :20 BE38 65 15 BERE PE DØ 04 C5 : F5 CØCØ Ø9 Ø1 85 01 58 4C 74 CA 07 85 BE 48 57 10 65 BBC0 A2 09 98 85 BE40 14 26 15 A5 14 68 02 68 68 : DB COCE 00 93 ØD OH 20 20 20 90 E6 60 BC 95 : 60 BE48 14 15 BBCB FA 20 02 SA CODO 53 45 4C 45 43 54 20 FF D2 :34 68 AB 68 C4 : 69 BESØ. EA 14 20 DB 50 BBDØ 61 FB SE FA CODE 59 53 54 45 40 20 53 54 05 20 : 10 BØ : 65 BE58 20 02 20 8808 34 90 06 D0 05 33 14 52 54 55 40 42 01 BEGØ FF SB BD 18 60 A9 00 :53 CØEØ 41 20 4E **2B E9** A4 :60 40 A5 BBEØ 10 60 38 COEB 52 20 ØD OH ØD OH FØ BE FØ : AB 45 BØ Ø1 88 85 84 42 : 62 BE68 85 14 85 15 AD BBE8 2C 41 29 C0F0 20 20 20 31 50 50 37 BD 85 BE70 4C 89 BE 95 Ø3 BD : 65 **A9** : 66 EØ 37 85 26 BBFØ 60 A9 20 COFB 34 PO 20 28 24 BA 4C : 49 BE78 BE 90 ED BE 00 BE 20 48 80 32 RRFR 27 40 OD OD C100 SE 43 30 29 20 :F1 BEBØ 29 30 80 ED BE 4C 85 38 86 33 F5 BC00 FE AD AG 37 C108 50 50 32 29 20 20 38 32 BEBB AD BE AD : 60 BE ED 00 84 4F 84 4E : 4F BCØ8 85 34 AØ 20 24 DE C110 38 20 20 28 85 SF 86 50 - 4E BESØ EE BE BD F4 BE 20 AE BE : 99 31 AB BC10 85 35 ØD ØD 20 20 EF C118 33 43 29 BE BD FЭ : A3 22 86 23 :00 BE98 85 AD 19 A2 00 85 15 BC18 A9 39 FØ C120 20 33 29 20 20 34 31 FØ : ØB BEAØ BE BD F4 BE 20 AE : 23 05 EA BC AD 16 FØ 50 BCPO C5 32 PØ 28 24 43 BB SD : 82 BE EA AD : 12 C128 35 A5 BEAB BE 85 14 40 64 8028 A9 07 85 53 AS C130 EE 00 00 00 62 0E 29 OF :23 ØF PF 85 22 86 P3 E4 30 DØ + BD REBO F3 BE C9 BB 90 BERM C138 ØD 20 20 41 43 54 49 56 BD :01 18 69 09 0A 0A ØA BC38 04 C5 PF FØ Ø5 20 99 BC ·FB BEB8 ØA 57 49 54 29 ØF : B2 C140 41 54 45 50 :70 ØA F3 85 58 86 59 PA ED RECO F5 BE 4C CE BE BC40 FØ 59 30 37 34 C148 58 A6 59 E4 32 - F2 BECS ØA ØA ØA SD F5 BE AD F4 : DØ BC48 85 53 AS C150 ØD ØD 00 93 ØF : 64 ΠØ 07 CS 31 na FB 4C E2 : 87 REDO BE C9 AE 90 ØB 29 18 C158 20 41 43 54 49 56 :93 22 86 23 AØ 00 B1 BED8 69 09 8D F6 BE 4E ES BE :83 BC58 85 49 54 48 20 53 C160 45 50 57 22 AA CB BI 22 ØB CB B1 + CD BEEØ 29 ØF BD FE BE AD F6 BE : 14 32 C168 59 53 38 38 ØD ØD BC68 22 65 58 B5 58 C8 B1 25 : BF BEER ØD FS BE 60 00 00 00 00 : 99 ØD C170 00 93 ØD ØD 50 20 41 121 BA 59 85 59 28 10 D3 : B7 BEFØ 00 OO 000 00 20 FØ ØF A5 BC70 65 C178 43 54 49 55 41 45 BC7A 30 D0 C8 B1 22 AØ 00 ØA : 1E BEFB 15 80 F3 BE AS 14 80 F4 :24 C180 57 49 54 48 20 53 59 90 BF :12 02 - ØF 00 30 FA 05 65 22 85 22 90 BFØØ BE AP. A9 BCBØ 69 C188 34 39 31 35 32 ØD ØD 23 59 130 04 : 80 05 00 F8 AD F3 BE : 7A RCAR F6 23 AS E4 BEOR FR FO FF EF FF FF FF 55 C190 00 FF BC90 C5 58 F0 BA 20 A3 BC F0 : 113 BF10 C9 27 F0 05 B0 0F 4C 30 ± C9 C198 55 FF 11 FF 55 FF 55 00

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4C

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Arcade Action

Get those characters moving with this latest routine in our programing series.

By Tony Crowther

hatever the type of game you are aiming to write on your computer, you will no doubt need some type of background. This background can be made to stand out even more if sections of it are moving.

For example in a platform game you may have ladders that move up and down or conveyor belts that move left or right. In this installment, I will be giving a routine that makes this type of animation extremely simple.

At this stage of the proceedings I was about to spout forth into a discussion on user defined graphics and how you can design your own characters when the editor brought me to halt screaming that this was covered in last month's magazine (see Everymans Guide to Graphics). I will therefore miss this out completely and jump straight into the programs and some examples.

What to do

Let's suppose that you are writing a program that requires the use of some rotating shapes in the background. If you take a look at Figure I you will see a simple design for a few characters that would make up the different animations of a moving ladder. If in Basic you were to print one character on top of the other then you would be getting the feeling that the object, in this case a ladder was moving.

If you take a look at Figure 2 you will find a Basic program for the C64, that will place the characters from Figure 1 into memory and proceed to print them over the top of each other. OK so it is simple and isn't a really useful example but should give you an idea of how character animation is achieved. In this case we just happened to define a ladder.

Arcade Routines

The problem with using Basic for altering a displayed character is that it is an extremely slow process and no matter what else you do within the program you would need to keep jumping to the section of it that changes the character. If you take a look at last month's issue of Your Commodore and my discussion of

interrupts, wouldn't it be easier to set up the character changing on an interrupt and leave the computer to handle it, thus leaving you free to control the rest of the program?

This is just what the program in Figure 3 will do. This is a Basic loader for a program that will animate a character on the screen on a Commodore 64 computer. If you want to see exactly how to program works then you can take a look at the assembly language for it in Figure 4.

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The Character Animate program uses the Interrupt Database program that was published in last issue so you must make sure that this has been loaded into memory before attempting to run any of the program presented here.

Once you have RUN the Character Animate program it is extremely easy

Macu Char or A	Metu Char for C	
ew Char ir B	Figure 1	

to use. All that is needed to set your characters changing is a simple SYS call followed by the data for the animations. The syntax for the command is:

SYS 49968, Char No. Data Pos, Animation Pos, Number of frames. Speed

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Char No is the number of the character to be animated. Up to eight different characters can be animated on the screen and are numbered from 0-7. It may help if you think of the eight different characters as a type of sprite.

Data Pos is the character that is going to be altered in the range 0 to 127. 0 is the same as the character code 128 so 1 will be a character A etc.

Animation Pos: This is the position in the character table that the animation sequence starts. All of the characters that are used for an animation should be placed one after the other and stored in character positions 0-119.

No. of Frames is quite simple the number of changes that is to occur to the character.

Speed is quite simply the rate at which the changes are to take place. This can range from 1 to 255 with 1 being fast and 255 being slow.

Before the animations will start you will of course have to tell the Interrupt database that this routine is in use. This is quite simple achieved by the following command:

POKE 836,1

Don't forget that you also have to start the IRQ data base with a SYS 49152 instruction.

In Use

Figure 5 gives an example of how this program can be used. It is fully documented so you should have no problems figuring out how it works. The program quite simply POKEs a number of characters to the screen and proceeds to animate them all as rotating stars at different speeds. Again nothing clever but it does demonstrate the power of this routine and should give you some ideas.

The next installment in this series of useful programming routines will be to provide you with a routine that is another animation routine, but this time to animate the C64s sprites.

PROGRAM: BASIC ANIM DEMO

- 98 90 PRINT"[CLR]"
- 2C 100 A =12288:B =53248
- 5E 110 REM A=START OF CHARS IN RAM
- 39 120 REM B=START OF CHARS IN ROM
- 40 140 POKE 56334,0: REM STOP TIMER
- C8 150 POKE 1,51:REM SWITCH IN CHAR ROM
- 3D 160 REM READ CHAR ROM INTO RAM
- 7C 170 FOR I=0T0512
- 53 180 POKE A+I, PEEK (B+I)
- 15 190 NEXT I
- 9D 200 POKE 1,55:REM SWITCH OUT CHAR ROM
- 37 210 POKE 56334,1:REM SWITCH ON TI MER 185 REM DATA FOR CHARACTER S
- FB 220 DATA195,195,195,195,195,195,2 55,255
- OD 230 DATA195,195,195,255,255,195,1 95,195
- 33 240 DATA195, 255, 255, 195, 195, 195, 1 95, 195

- B6 260 FOR I =0 TO 23
- EA 270 READ B
- 29. 280 POKE A +520 +I ,B
- 88 290 NEXT I
- AE 300 POKE53272, (PEEK (53272) AND240) +12
- B3 310 REM NOW LETS PRINT OUR LADDER
- 70 320 LET A\$="[RIGHT10]"
- 62 330 PRINT"[HOME]":FOR X=1T010:PRI NTA\$;"[SA]":NEXT:REM PRINT COLUMN OF SHIFTED-A
- C7 340 REM NOW LETS PRINT OTHER CHAR ACTERS OVER THE TOP
- DA 350 PRINT"[HOME]":FOR X=1T010:PRI NTA\$;"[SB]":NEXT:REM PRINT COLUMN OF SHIFTED-B
- BO 360 PRINT"[HOME]":FOR X=1T010:PRI NTA\$;"[SC]":NEXT:REM PRINT COLUMN OF SHIFTED-C
- CC 370 REM KEEP GOING AROUND LOOP
- 6A 380 GOTO 330

PROGRAM: CHAR ANIM

- 35 100 DATA162,0,134,255,32,253,174, 32,1042
- EE 101 DATA138,173,32,247,183,166,25 5,165,1359
- AB 102 DATA20,157,122,3,232,224,5,20 8,971
- D7 103 DATA233,169,123,141,94,192,16 9,195,1316
- 97 104 DATA141,95,192,172,122,3,192, 8,925
- 65 105 DATA176, 32, 173, 123, 3, 153, 143, 3, 806
- 1D 106 DATA173,124,3,153,159,3,173,1 25,913
- FF 107 DATA3,153,167,3,173,126,3,153
- 1A 108 DATA151,3,169,1,153,175,3,153
- C5 109 DATA135,3,96,173,68,3,240,250 ,968
- B8 110 DATA162,0,254,127,3,189,127,3 ,865
- BC 111 DATA221, 151, 3, 144, 10, 169, 0, 15 7,855
- ED 112 DATA127,3,189,175,3,208,3,76,784
- E1 113 DATA251,195,254,135,3,189,135 ,3,1165
- D6 114 DATA221, 167, 3, 144, 5, 169, 0, 157

- . 944
- 81 115 DATA135, 3, 169, 0, 133, 251, 189, 1 43, 1023
- 03 116 DATA3,133,250,6,250,38,251,6, 937
- CE 117 DATA250, 38, 251, 6, 250, 38, 251, 1 65, 1249
- 6C 118 DATA251, 24, 105, 52, 133, 251, 189 , 159, 1164
- EC 119 DATA3,133,252,169,0,133,253,6
- 09 120 DATA252,38,253,6,252,38,253,6
- 5B 121 DATA252, 38, 253, 189, 135, 3, 10, 1 0, 890
- BE 122 DATA10,133,254,165,252,24,101,254,1193
- B5 123 DATA133,252,165,253,105,48,13 3,253,1342
- FA 124 DATA160,0,177,252,145,250,200 ,192,1376
- 85 125 DATA8, 208, 247, 232, 224, 8, 176, 3 , 1106
- DA 126 DATA76,130,195,96,169,123,141 ,97,1027
- 2B 200 POKE 53280 ,0
- 29 201 POKE 53281 ,0
- 5C 202 PRINT"[CLR,C5]"
- 40 203 A\$= "[SPC6]"
- 1A 204 PRINTA\$"*************

- 01 205 PRINTA\$"*[SPC24]*"
- A7 206 PRINTA\$"*[SPC3]CHARACTER ANIM ATION *"
- DF 207 PRINTA\$"*[SPC5]MEM.49968-5017
 9[SPC4]*"
- 06 208 PRINTA\$"*[SPC24]*"
- B8 209 PRINTA\$"* POKE 836 ,1[SPC12]*
- 28 210 PRINTA\$"*[SPC24]*"

- 09 211 PRINTA\$"* SYS 49968 , CHAR NES WJ.[SPC4]*"
- 68 212 PRINTA\$"*ESPC111, DATA POS.ESP C3]*"
- OA 213 PRINTA\$"*(SPC11],ANIM POS.[SP C3]*"
- D4 214 PRINTA\$"*[SPC11],N[SW].OF FRA MES*"
- E6 215 PRINTA\$"*[SPC11],SPEED[SPC7]*

- 2E 216 PRINTA\$"*[SPC24]*"
- 75 217 PRINTA\$"*********************
- 4C 300 LI =100 :FOR I =: 49968 TO 501 79 STEP8 :T =0 :FOR J =0 TO 7 :RE AD A
- E6 301 POKE I+J .A:T =T +A :NEXT J:R EAD A:IF A<>T THENPRINT"ERROR IN LINE "LI :END
- 05 302 LI =LI +1: NEXT I

PROGRAM: CHAR ANIMATE 1000 ;*************** 1010 ;**** ANIMATE CHAR **** 1020 ;**************** 1030 : 1040 : HOW TO USE 1050 ; BASIC : M/C 1060 ; ----: 1070 ; 1080 ;SYS49968,XX1,XX2,: LDA #XX1 : STA 890 1090 ; XX3, XX4, XX5 1100 ; : LDA #XX2 1110 ; (XX* ARE DEALT : STA 891 1120 ; WITH IN TEXT : LDA #XX3 1130 : OR SEE BASIC : STA 892 : LDA #XX4 1140 ; LOADER.) 1150 ; : STA 893 : LDA #XX5 1160 ; : STA 894 1170; 1180 ; POKE 836, NO : LDA #NO 1190 ; (SET UP IN IRQ : STA 836 1200 ; DATA BASE.) : JSR 49995 1210 ; 1220 ; NO = 0 OR 1 1=ON 0=OFF 1240 ;****************** 1250 ; 1260 PAGE = 250 1270 JUMPTB = 49246 ; JMP TABLE 1280 FLAG = 836 1290 BASIC1 = 44797 1300 BASIC2 = 44426

1310 BASIC3 = 47095

1320 PAGE1 = 20

1330 FLAG1 = 890

1340 COUNT = 895

1350 FLAG2 = 903

1360 FLAG3 = 911

1370 FLAG4 = 919

1380 FLAG5 = 927

1390 FLAG6 = .935

1400 FLAG7 = 943

1410 * = 49968

1420 ; 1430 ; 1440 PROG1 1450 LDX #0 1460 L00P12 1470 STX PAGE+5 1480 JSR BASIC1 ; GET 3 NUMBERS 1490 JSR BASIC2 1500 JSR BASIC3 1510 LDX PAGE+5 1520 LDA PAGE1 1530 STA FLAGI, X 1540 INX 1550 CPX #5 1560 BNE LOOP12 1570 LDA #<PROG2 ; CHAIN PROG2 TO IRQ 1580 STA JUMPTB 1590 LDA #>PROG2 1600 STA JUMPTB+1 1610 LDY FLAG1 - 1620 CPY #8 ; CHECK BIGGER THAN 8 1630 BCS LOOP5 1640 LDA FLAG1+1 ; SET NEW FLAGS 1650 STA FLAG3, Y 1660 LDA FLAG1+2 1670 STA FLAG5, Y 1680 LDA FLAG1+3 1690 STA FLAG6, Y 1700 LDA FLAG1+4 1710 STA FLAG4, Y 1720 LDA #1 1730 STA FLAG7, Y 1740 STA FLAG2, Y 1750 LOOP5 1760 RTS 1770 ; 1780 PR0G2 1790 LDA FLAG ; CHECK ON/OFF FLAG 1800 BEQ LOOP5 1810 LDX #0 1820 LOOP1 1830 INC COUNT, X ; SPEED OF CHANGE

1870 LDA #0 ; RESET COUNT 1880 STA COUNT, X 1890 LDA FLAG7, X ; ON OR OFF 19.00 BNE LOOP4 1910 L00P10 1920 JMP OUT2 1930 LOOP4 1940 INC FLAG2, X ; INC ANIMATION 1950 LDA FLAG2, X 1960 CMP FLAG6, X ; CHECK WITH 1970 BCC_LOOP6 ; ANIMATION MAX. 1980 LDA #0 ; RE-SET ANIMATION 1990 STA FLAG2, X 2000 L00P6 2010 LDA #0 2020 STA PAGE+1 2030 LDA FLAG3, X ; CHAR TO CHANGE 2040 STA PAGE 2050 ASL PAGE ; MULTIPLY BY 8 2060 ROL PAGE+1 2070 ASL PAGE 2080 ROL PAGE+1 2090 ASL PAGE 2100 ROL PAGE+1 2110 LDA PAGE+1 ; ADD 13312 2120 CLC 2130 ADC #52 2140 STA PAGE+1 2150 LDA FLAG5, X 2160 STA PAGE+2 ; POSITION OF 2170 LDA #0 : ANIMATIONS 2180 STA PAGE+3 2190 ASL PAGE+2 ; MULTIPLY BY 8 2200 ROL PAGE+3 2210 ASL PAGE+2 2220 ROL PAGE+3 2230 ASL PAGE+2 2240 ROL PAGE+3 2250 LDA FLAG2, X ; ANIMATION POS = 2260 ASL A ;FLAG2 * EIGHT 2270 ASL A

2280 ASL A

2310 CLC

2290 STA PAGE+4

2300 LDA PAGE+2

1840 LDA COUNT, X

1850 CMP FLAG4, X

1860 BCC LOOP10

ADC	PAGE+4		
STA	PAGE+2		
LDA	PAGE+3		
ADC	#48 ;A	DD	12288
STA	PAGE+3		
LOOPS	3		
LDY	#0		
	STA LDA ADC STA LOOPS	STA PAGE+2 LDA PAGE+3 ADC #48 ;A	ADC #48 ;ADD STA PAGE+3 LOOP8

01 RE

:R

2390	LOOP	7
2400	LDA	(PAGE+2),Y ; LOAD NEW DATA
2410	STA	(PAGE), Y ; STORE IN CHAR
2420	INY	
2430	CPY	#8 ; DO ALL 8 BYTES
2440	BNE	L00P9
2450	OUT2	

EB 14 READ B

2460	INX	
2470	CPX	#8 ; DO ALL 8 CHARS
2480	BCS	0UT1
2490	JMP	L00P1
2500	OUT1	
2510	RTS	
2520	.END	

PR	OGRAM: CHAR ANIM DEMO
2A	0 A =12288 :B =53248
F6	1 SYS 49272: REM SWITCH OFF THE IR
D4	2 POKE 56334 ,0:REM STOP TIMER
67	3 POKE 1 ,51 : REM SWITCH IN CHA
E8	4 FOR I =0 TO 512
20	5 POKE A +I , PEEK(B +I)
ED	6 NEXT I
F7	7 POKE 1 ,55
AA	8 POKE 56334 ,1:REM DATA FOR ANIM ATIONS
46	9 DATA 24,24,24,255,255,24,24,24
98	10 DATA 48,48,55,31,248,236,12,12
67 OD	11 DATA 0,102,110,56,28,118,102,0 12 DATA 4,78,236,120,30,55,114,64

4F 13 FOR I =0 TO 31

page.	A 1 IIIIIII W
D2	15 POKE A +512 +I ,B
FB	16 NEXT I
7F	17 A\$(1) ="[WHITE,S*]"
FA	18 A\$(2) ="[C8,SA]"
FF	19 A\$(3) ="[C4,SB]"
119	20 A\$(4) ="[C5,SC]"
3D	21 FOR I =0 TO 128 : REM BLANK OFF
	CHARS
OA	22 POKE A +1024 +I ,255
FC	23 NEXT I
3A	24 POKE 53281 ,0
38	25 POKE 53280 ,0
B4	26 POKE 53272 ,29:REM SWITCH INTO
	U.D.G.
59	27 PRINT"ECLR3"-
AO	28 FOR I = 0 TO 399 : REM PRINT ON SCREEN

OD 29 R = INT(RND(1) *4 +1)

54	30 PRINT A\$(R) ;
F4	31 NEXT I
FB	32 SYS 49152 : REM IRQ ON
B4	33 POKE 836 ,1 : REM SWITCH ON OR OFF
56	36 P =0
B5	37 PRINT"[HOME,DOWN13] [C5,SPC8] CHAR ANIMATION DEMO"
13	50 A =INT(RND(1) *16)
BE	51 B = INT(RMD(1) *400)
10	52 C =RND(1) *200
07	53 POKE 1064 +B ,A +128:REM RANDO M CHAR
7F	54 P =P +1
A2	55 IF P <10 THEN 50
6A	56 P =0
D4	57 REM SET UP THE ANIMATION
2D	58 SYS 49968, A/2, A, 64, 4, A/2
17	59 GOTO 50

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Oxford Basic

A new package from Systems Software to take the drudgery out of Basic programming.

By Stuart Cooke

A craftsman of any type would be lost without a decent range of tools. A programmer too will find life a lot easier if he holds a collection of programming tools designed to make programming easier.

Systems Software has produced a package, entitled *Oxford Basic*, that provides a Basic programmer with an excellent selection of programming utilities.

The package contains four major *
programs. These are, a compiler to
speed up execution of Basic programs,
a toolkit providing the user with seven
useful commands, a compressor to
reduce the amount of space that a
program takes up and an analyser that
produces a list of important program
information.

Getting Started

Unlike many other program houses, Systems Software does not put any protection on programs. This means that you can make copies of any programs that you want to use and place them on the relevant disk.

However, before you can start any program you must enter a series of colour codes. These vary every time the program is used and are found on a coloured grid of 27*40 dots. Some people don't like this type of protection as it is time consuming finding the codes every time the

program is to be used. Personally I don't mind it, the fact that you can make a backup of expensive software is much more important to me.

Probably the best way to deal with this package is to take a look at each section in turn.

Ox-Comp

This section of the package is a Basic compiler. In essence this takes a Basic program and turns it into machine code generating a program that will RUN much faster than the original Basic version.

Before you can use the compiler for the first time you must set yourself up with a series of work disks. These should consist of a disk containing the compiler and one containing a set of compiler utilities.

Compiling a program is extremely easy. All you have to do is RUN the OX-COMP program and when requested enter the filename of the Basic program to be compiled. The program will then do the rest.

OX-COMP isn't totally compatible with C64 Basic, though the differences shouldn't cause anyone too many problems. Perhaps the major difference between normal Basic and OX-COMP is with arrays.

OX-COMP does not allow you to use three dimensional arrays within your program. However if you do have a program that uses this type of array then there is help to hand. One of the OX-COMP utilities, PRE-SCAN, will go through a program and change all three dimensional arrays to 2D.

OX-COMP also needs to know, at compile time, the dimensions of all arrays. Therefore you can't use a parameter as the dimension of an array, you must use a constant. This shouldn't cause any problems if you dimension the array to the maximum size you expect to need.

Other commands not allowed in OX-COMP are LIST, CONT and SAVE

Programs that are to be used by OX-COMP can make use of extra commands that the package provides.

User defined string and mixed functions are allowed.

Integer FOR/NEXT loops are allowed. This gives a slight speed advantage when the program is used.

When writing a normal Basic program only the first two characters of any variables are taken into consideration, for example, DEVICE and DEVELOP would be the same as far as Basic is concerned. With OX-COMP you can force the compiler to recognise every character of a variable name, in the above example the two variables would be different.

Simple commands are also included to enable and disable the STOP key.

Before you can compile any program it is important that you check

for errors. Since a machine code program doesn't have any line numbers, if an error occurs while running a compiled program, it isn't easy to sort out exactly where in the original Basic program the error is. A utility program is provided so that, if your compiled program stops with an error, you can find out at which program line this occured. It's now up to you to get out the original Basic program, find and solve the problem and then re-compile the program.

If you are a good Basic programmer but don't want to start learning machine code then this compiler will be an extremely powerful tool, you can write your programs easily, make sure they work and then use the compiler to speed things up.

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When you write a Basic program it is very difficult to remember if you have used a specific variable or whether you have some lines from an earlier version of the program that are no longer needed. ANALYZER produces reports on the specified Basic program allowing you to check the program thoroughly.

Once the ANALYZER has 'looked' at the program specified, a menu is produced showing the various options available.

The first option is to produce a 'Flow cross reference'. This is a list of all lines that are accessed by a GOTO or GOSUB statement followed by the lines that call them. This is useful if you are trying to trace a program through.

The 'Data cross reference' option produces a list of all the variables, arrays and functions that are used within a program. Again a list of the lines where they are used follows the variable name. This option is great if you are trying to find out just what variables are being used. It also helps when you want to make sure that you haven't used the same variable for more than one purpose, an extremely common programming fault.

An interesting option is that of 'dead wood analysis'. This produces a list of all the lines that are in a program that will never be reached. If a program has undergone many modifications it is not unusual for program lines to become redundant,

this option allows you to see just which lines are no longer used. This is also useful when debugging a program as it allows you to check if a certain section of the program is being reached.

One nice feature of the 'Dead Wood' option is the fact that ANALYZER will strip these lines from the program and SAVE the new version out to disk.

If you want to improve on the execution speed of any program, placing all of the variables in the first lines will help. The Generate Header File option will create a file that sets up all of the variables in your program. This can then be added to your program with the MERGE function of the toolkit.

The final option of this section of the package is the ability to print out information about the file. Information provided is the length of the program, how many variables that you have used, the arrays that you have used and how many lines, GOTOs, GOSUBs, variables and arrays are in the program.

Compressor

When you have generated what you think to be the most effective Basic program by using the ANALYZER to strip unwanted lines and created a header for the program, there will no doubt be further ways of improving the operation and saving space. The compressor helps with this as it removes all unnecessary spaces and REM statements from the program. It then packs as many statements as possible on to each program line and then finishes by renumbering the program. This results in a much smaller Basic program that will usually RUN a little bit faster.

Do make sure that your program is bug free before you use this type of program since it is impossible to debug a compact program.

Toolkit

This program merges itself into an area of the C64's memory which is not in use when writing Basic programs. Once this has been done the Basic language on your C64 has a further eight commands added to it. If you already own a programmer's toolkit

then this may not seem to offer many commands, however, the commands are the ones that I find myself using most of the time from the larger packages.

The commands available are:

FIND: this is used to search through a specified program range for a specific string of characters. you could for example list all the lines in the program that contain the string PRINT or specify that you want all of the lines from 1000 onwards that contain a PRINT statement.

CHANGE is a modification of the above command as it also searches as specified for a specific string. The modification is that this command allows you to then change the string into a new one. For example you may change all of the PRINT statements between lines 500 and 1000 into PRINT 1.

DUMP will display a list of all the variables used in a program and their values. This is an extremely useful command to have when trying to debug a program since you can look at the state of each variable.

INFO is similar to the Basic FRE command as it gives you statistics on the program in memory. INFO is greatly expand from the usual FRE statement since it not also gives the amount of free memory but many other parameters as well. Data produced by this command is:

- 1) The number of bytes occupied by Basic.
- 2) The number of bytes used by variables.
- 3) The number of bytes used by arrays.
- 4) The number of bytes used by strings.5) The number of bytes free excluding
- variables etc.

 6) The number of free bytes including variables etc.

As you can see, quite a comprehensive range of information.

MERGE allows you to merge programs together. This is very useful if you have a library of subroutines, such as ones to read the joystick or produce sounds. You can MERGE this into any program that you are writing and it will save you from rekeying all of the program again. The

YOUR COMMODORE june 1987

only real problem with this command is that it is up to you to make sure that the programs to be MERGEd do not have any line numbers that are the same.

RENUMBER as its name suggests, allows you to RENUMBER the program lines. This RENUMBER takes care of all GOTOs GOSUBs etc. as well as allowing you to specify if you only want to RENUMBER certain areas of the program.

DELETE simply erases the specified range of lines from a program.

TYPE allows you to read the contents of the specified file on screen. This is exceptionally useful if you want to examine the contents of a SEQ file say from a database or wordprocessor.

SIZE will give you the program size of any a specified file on disk.

As I have already stated, the range of commands presented is not great but the ones that are available are all extremely useful and no Basic programmer should be without them.

Verdict

Oxford Basic offers the user a sophisticated and extremely useful range of utilities. There isn't such a thing as a perfect piece of software and Oxford Basic is no different.

Probably, my main gripe about the package is that in the routines that are asking for a file from disk you are not able to get a directory and check the files on disk. For example say you want to compile a program called FRED/1 you could enter this only to find that the file isn't on the disk in the drive. Without a directory option you have to stop the compiler program, LOAD the directory, list it to the

screen, to find your program is really FRED.1, and then re-load the compiler, go back through the protection scheme and then try to compile the program again. A simple display directory option would SAVE a lot of time.

A RAM-DISK program is also available from System Software. This allows you to treat an area of the C64's RAM as a disk drive giving you immediate acess to small files. It is possible to buy Oxford Basic together with this program, but we didn't have access to it for this review.

The package may seem a little pricey to some people but if you take a look at each of the programs that it provides, you can see that it is well worth it.

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MIDI and Your Micro

MIDI is a fascinating subject if you're vaguely musical.

Here we bring you a comprehensive breakdown of

currently available packages.

By Ian Waugh

Since the advent of MIDI, hardware and software packages have proliferated at the speed of bunnies. There are now so many music and MIDI packages on the market that it is difficult to know just what is available. Between me writing this and you reading it, new programs will have appeared and others updated. Some may have been removed from sale, new companies will have been formed and some companies may even have ceased trading. Yes, it's a busy life in the MIDI music software market.

Making a Choice

There are more music and MIDI packages for the Commodre 64 that ann the other computers put together so you couldn't have chosen a better computer for making music. Choosing a package is another matter. How do you decide? This guide is aimed at helping you narrow down the type of package you are interested in. Most companies will be pleased to send you their literature and some will be happy to answer any queries you may have by phone.

One important point to bear in mind is this: most manufacturers

produce their own interface and their software usually won't work with a different one. This could severely limit your choice as, having bought an interface you could find yourself restricted to software packages from that one company. Some producers, however, are converting their programs to run with other interfaces. This can only be good for the customr – that's us – and is to be welcomed.

MIDI is not the be all and end all of computer control, however, and there are other stand-alone packages which you may like to consider such as Commodore's Music Expansion System. Perhaps something like that suits you better. Don't let technology bully you into buying a computer music system. Look into the subject, read about what it can do and then made your decision.

For those who have read and decided, there follows a brief run down of what you'll find in the market place.

MK5 MIDI

Famous for the Spectrum and Amdrum (why not Comdrun?),

Cheetah has just released the MK5 MIDI controller keyboard which can be used with any MIDI Interface. It has five octaves of full-sized keys and you can select MIDI channel, shift the keyboard range over an octave and transmit a MIDI patch change number between one and 128.

C-Lab

Available from Sound Technology, C-Lab's Super Track Sequencer's (£115) forte is real-time input although you can record in step-time, too. A single screen is used for all major operations but you can call up a MIDI Event Editor screen which lets you plod around in the depths of MIDI's innards. You don't have to get involved, though, and even without delving, the program is easy to use. Definitely one for your short list.

C-Lab produces a MIDI interface (£79) and a Sync interface (£106) although the software will work with a number of other interfaces including Steinberg's.

A scorewriting package called Score Track is in the offing.

YOUR COMMODORE june 1987

Commodore Interface

Commodore produces the cheapest MIDI interface on the market – so far – at £19.95, designed for use with packages such as the *Music Studio*, *Music Expander* and *Sampler*. No separate so: tware is available yet.

Also, in conjuction with Music Sales, Commodore has several programs and add-ons at pocket-money prices. For example, a little clip-on keyboard overlay and album music to play. The Music Expansion System (£144.99) consists of a keyboard, some SID voice editing software and an FM Sound Expander. All items should be available separately. FM systhesis is really the bee's knees – as long as you don't have to program it – but the Expander restricts you to only a few presets.

The new packages are available to supplement the Expander's restricted facilities; an Editor to help program in music notation (both at £24.99). You should really budget for the Editor along with the Expander and if your're at home with music notation, get the Composer, too.

Electromusic

Electromusic Research Ltd is the world's most prolific producer of MIDI packages and has produced hardware and software for almost every popular home computer.

EMR's Commodore 64 interface is very reasonable (£79.90) a link box called MIDLINK (£34.95) with one MIDI IN and six MIDI THRU sockets is also available.

Software for the C64 includes the Miditrack Performer (£49.95), an eight-track, real-time polyphonic sequencer with features such as punchin (no punch-out, though) track merging and transposition.

Their Miditrack Composer (£44.95) is a six-track step-time editor with a good range of editing facilities although you will find it difficult to enter odd note durations – as I sometimes wish to do during frenzied bouts of composition.

The Miditrack Editor (£39.95) gives you step-time editing control over the Performer tracks and will convert Composer tracks to real-time. This really takes you down among the bits and bytes.

Finally, Vu-Music (£24.95)

converts MIDI info into visual patterns. It only does this in real-time, however, and cannot produce a display from a pre-recorded piece.

EMR software gives you a great deal of control over your music although it helps if you have some knowledge of MIDI. The packages are quite cheap for the facilities offered and are continually being updated. EMR also provide a MIDI INFOLINE (0702 335747) and the helpful people there are glad to assist with any MIDI series. They also ;run special package deals, too, so phone for details.

MIDI 1.1

The MIDI 1.1 (£300) from Hinton, although not exclusively for the C64, provides an interface between MIDI equipment and a computer with an RS232 socket. Software has yet to appear but a utility program is aimed at encouraging you to write your own.

Jellinghaus

The Jellinghaus Commodore 64 interface (£90) was commissioned from SIEL (see SIEL) and has a MIDI IN, a MIDI THRU, three MIDI OUTs and an external Clock In.

The 12-track Recording Studio (£99.95) is a real-time package which holds velocity, after-touch, pitch-bend and patch-changfe information. It is quite easy to use but the manual could be better (unless it has been improved recently).

The Sequence Chain Program (£45) allows sequences to be linked to produce changes in time signature and tempo. Patch changes can also be stored.

The Scorewriter (£340) produces a hardcopy of your music, including lyrics. It contains three programs on EPROM: the 12-track Recording Studio, the Sequence Chain Program and the Scorewriter itself which seems, therefore, to cost around £195. Rather expensive, perhaps, but the EPROM means the programs are instantly available. The program works well but you may have to do a lot of setting-up to produce the results you want. The manual could be better but the printed notation is excellent.

The SixTrack Sound Editor (£50) is a voice editor for Sequential's SixTrack and MAX polysynths.

Joreth

The Joreth Music Composer System (£225) comprises their own AL25 interface and software (recently upgraded) which includes real- and step-time sequencing and editing.

Joreth's approach has been aimed at the musician rather than the computer buff. The 70-plus page manual contains all you need to know and, although it is quite a lot to wade through, a Quick Reference Guide helps so don't be put off. There are also several loose sheets of notes, information and corrections.

The program offers eight-track real- and step-time sequencing and uses a simple low-level MCL (Music Composition Language). Although it takes a significantly different approach to most software packages it is easy to use considering its complexity. It must be a strong contender for the best overall C64 MIDI package.

Other programs include a Real-Time Part Loader (£11.85) which allows the loading of real-time files part by part, from multiple files.

The Key Programmer (£11.85) accepts input in any key (or even no key) and allows key selection for printout at a later date.

For Casio CZ owners, the *Tone Editor* (£44.85) simplifies voice editing and permits voice storage on disk – a real boon.

Brand new is Joreth's *Linker System* (£94.90), an extension of the real-time system in their MCS. It allows you to link, loop and repeat up to 128 section of music with near-infinite precision.

Also new is the System 7 (£79.99), for Yamaha's DX7 and TX7 synths. It's a rather superb voice editor and libration with lots of editing facilities, 320 free sounds and a sophisticated library organisation system which lets you build up and name your own blanks of 32 voices.

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All Joreth's programs now run with other interfaces, too, although their AL25 has very impressive syncing facilities and is worth considering if this is your first interface.

Passport

The Passport Designs Commodore interface (£110) has a MIDI IN, MIDI OUT, drum sync In and Out with 24,48 or 98 ppqn (pulses per quarter note) to suit most drum machines. It has

become something of an industry standard - which means that other companies have copied it and are probably selling it cheaper.

Software for the Commodore includes MIDI/4 Plus (£80) and MIDI/8 Plus (£120), four- and eight-track real-time sequencing packages. The software is fairly easy to use, has good editing facilities and lets you merge tracks very easily.

Music Shop for MIDI (£80) is a step-time program. Notes are entered and shown in traditional notation and the program will produce a printout of your choice. It is very easy to use but much MIDI exotica is not supported, a fact which will not worry many users but bear it in mind. It works superbly with multi-timbral instruments such as Casio's CZ synths. A very good and easy introduction to MIDI and good value.

Also available is the Midi Player (£65) which stores up to eight songs/arrangements on a disk and produces a synchronised video display on the screen during playback.

Rainbird

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Produced in association with System Software. The Advanced Music System from Rainbird (£39.95) is a SID-orientated music package – the best there is – which also includes some MIDI software. It is designed to work with the SIEL and Passport interface and is basically a six-track real-time sequencer. It doesn't compare with a dedicated MIDI package – and really isn't intended to – but it gives you the opportunity to experiment with MIDI. For example, it lets you convert music files to MIDI files and vice versa.

SIEL

SIEL recently sold out to Chase, a company which claims that it intends to continue to support SIEL keyboards and MIDI software. That being so, there follows a list of SIEL packages. Other music stores may still have stock, too. The prices are SIEL's and Chase may not adhere to them (they may even be reduced) but they are a guide.

The SIEL interface for the Commodore 64 (£79) is identical to IM'S.

The Live Sequencer (£69) for the C64 is an excellent 16-track real-time sequencer. It is easy to use and,

although editing could be better, it's good value.

The Multitrack Composer (£39) is a six-channel step-time sequencer with lots of editing facilities but putting notes in can take time.

The Expander Editor (£53) helps enormously with editing on SIEL's Opea 6, DK600 and Expander 6 by showing parameters graphically on the screen. The DK80 Editor (£55) is for the DK80. Both programs have good graphics and editing facilities. A

MIDI Data Base (£39) can store 250 patches from any MIDI synth apart from Yamaha's DXs and Casio's CZs. That probably excldes more than half the synth owners in the UK but if you're one of the others it's a worth-while program.

Steinberg Research

Steinberg's Pro 16 Sequencer (£100) is a 16-track real- and step-time sequencer with perhaps better realtime facilities than step-time. In operation it has taken its inspiration from a 16-track tape recorder. For example, you can edit a sequence by punching in and out. A very respectable, professional piece of software, competatively priced.

The TNS (The Note System) Scorewriter (£130) produces a printout of a Pro 16 recording in traditional notation. It affords a degree of steptime entry and allows you edit the pieces which can then be played from the Pro 16.

An Edit Kit comprising a note editor and drum machine editor for the Pro 16 is available for £30 and a combined Pro 16 and Edit Kit is available on cartridge for £207.50 and a combined Pro 16 and TNS is available for £285.00.

The INT MIDI interface will set you back £150.

The packages are very profesional, thorough and impressive. Definately worth serious consideration.

Track Star (£70) is an entry-level MIDI package containing its own MIDI interface. If MIDI puts the willies up you then Track Star is for you.

Cosmo (£77.50) is a voice editor and library system for Casio's CZ synths, a might on the expensive side although it contains 128 sounds on disk. SES (also at £77.50 does likewise for Yamaha's DX and TX synths) MIR (£120) is a visual editing system for the Mirage keyboard and expander.

Dr. T

Dr. T is an American software company, producing its own MIDI interface (£90) but the software will work with Passport's Sequential and possible other interfaces.

The Keyboard Controlled Sequencer (£125) combines real- and step-time in one. It has lots of features not found in other software such as Time Reverse which plays a sequence backwards and Auto Channel Assign which re-assigns consecutive events to different channels. Real-time is easy to use. Step-time has lots of options to let you program as many weird notes and time signatures as you wish. Certainly more products worth serious consideration.

Dr. Talso produces Casio CZ (£65) and Yamaha DX (£75) Library Programs.

Touchline

Cheetah Marketing: 1 Willowbrook Science Park, Crickhowell Road, St Mellons, Cardiff. Tel: 0222 7773377. Sound Technology: 6 Letchworth Business Centre, Avenue One, Letchworth, Herts SG 2HR. Tel: 0462 675675.

Commodore: 1 Hunters Road, Weldon, Corby, Northants NN17 1BR. Tel: 0536 205555.

EMR: 14 Mount CLose, Wickford, Essex SS11 8HG. Tel: 0702 335747. Hinton Instruments: 168 Abingdon Road, Oxford, Oxon OX1 4RA. Tel: 0865 721731.

Jellinghaus: from Rosetti, 138-140 Öld Street, London ECIV 9BL. Tel: 01 253 7294.

Joreth: PO Box 20, Evesham, Worcs WR11 5EG. Tel: 0386 831 615.

Passport Designs: from Ritter Music Europe, 24 Bromgrove Gardens, Edgeware, Middx. Tel: 01 952 5302.

Rainbird: First Floor 74 New Oxford Street, London WC1A IPS. Tel: 01 240 8838.

SIEL: from Chase, 22 Charlton Street, Off Euston Road, London NW1. Tel: 01 387 7626.

Dr T: from Take Note Music Services, 112-126 Camden High Street, London NW1 ONB. Tel: 01 267 6813.

Mini Office II The Facts

Mini Office II from Database Software will turn your C64 into a complete home office at a ridiculously low price

By Gordon Hamlett

Pity the small businessman. There he is, trying to eke out an existence and everywhere he looks, he is faced with a plethora of advertisements imploring him to computerise. The idea makes a lot of sense but where does he start? What machine and, more importantly what software does he need?

There is also the small matter of cost. Hardware can cost anything from a few hundred pounds up to an infinite limit. Then you need to buy the big three — a word processor for your letters, a spreadsheet for managing your finances and a database to keep track of all your clients. The list goes on and on. Wouldn't it be nice if you could use the C64 that you've already got instead of splashing out on a new system.

Well, surprise surprise, you can. I wouldn't really be writing this article otherwise. The software packages mentioned above have been available for a long time but there has always been the nagging problem of compatibility — how easy is it to transfer information from your database to your word processor or whatever?

The Solution

Mini Office II is the name of the

product which can do all this. Database Software has put together a fully compatible big three. Not only that, graphics, communications and label printing packages have been thrown in as well. Very useful, you may say. All I've got to do now is save enough pennies to buy this Mini Office II.

That shouldn't be too difficult either for, unbelievably, the package comes in at well under 20 pounds! And if that still proves to be too much, you can always enter our competition this month and try to win one!

The package comes on tape or disk but anyone wanting to use any sort of computerised system to run their business will soon discover that a tape based system soon becomes unmanageable. That is not to say that the tape package is useless. It is ideal for anyone who wants to learn about using business software.

In the Office

On loading Mini Office II, you are presented with a main menu allowing you to access any of the six programs. Selecting one of these loads the appropriate program and leads you into a further menu of choices. Any Commodore or Epson compatible

printer is fully supported and most others should work perfectly. The only problem areas are likely to be in printing screen dumps from the graphics package.

Word Processing

The world processor is fairly comprehensive, containing the majority of commands that you are ever likely to use. These commands are entered via a combination of the control, logo and function keys. I found these to be strangely organised but this could just be that I am used to a totally different set of commands on my current wordpro. Files can be saved either as text or ASCII. This latter option is useful if you intend sending a document somewhere down a modem.

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Before you print a document, you can alter various settings — headings, margins, page length etc. If you are likely to use the same settings time and time again, it will be worth your while setting up a file containing these commands that you can call up at will rather than have to enter everything separately all the time. Other facilities include a mail merge — useful when you are sending out a series of

standard letters and an automatic word count - ideal if you are writing magazine articles for demanding

Computer Card Index

A database is no more than a collection of information. Where the computerised version scores over the traditional card box is the way that information can be accessed and manipulated.

The database consists of a series of records. Each separate record might correspond to e.g. a name and address of a customer or details of a record in your collection. Each record is further divided up into fields e.g. title of record, recording artist, recording company, date of release and price.

In Mini Office II, each record can consist of up to 20 fields and you can design the structure yourself. you can specify whether you want a field to contain alphanumeric characters (i.e. anything), decimal, integers, date or a formula. Designing the actual structure of a record is the hardest part and some considerable thought should be used. How many records you can have in a particular database depends * on how big the record is. One disadvantage of the C64 is that the available memory soon gets used up although you can of course set up several similar bases if you find that you have too many records.

Where databases become particularly useful is when you want to access the information. Records can be sorted on any field or a combination of them and it is easy to extract bits of information rather than complete records. A typical example would be a club secretary writing to his members to remind them that their annual subscriptions are now due. Not everyone will have joined at the same time so you instruct the computer to pull out only those records that apply. you can then use the mail merge facility in the wordpro to send them a personalised renewal form.

If planning a database is hard, then doing the same for a spread sheet is doubly so. Yet for anyone running a small business, the results are definitely worthwhile.

Calculations

A spreadsheet is no more than a large piece of paper, divided up into rows and columns, with each individual area called a cell. You put figures into these cells and the computer juggles them about for you. Sound complicated? It's not really that bad.

Suppose that you were using the spreadsheet to keep a note of your company's money - bills to be paid and invoices received. You could set things up as follows:- Across the top of the sheet, you could have a column for each month of the year and down the side, details of your previous expenses and profits. Data can then be entered accordingly.

So far, this does not seem to offer much of an advantage over the paper and pencil method. The first advance comes from the fact that a particular cell can also be a formula rather than just an item of data. Thus you could have a row marked total expenses and let the program work out the sum of the previous rows for you. OK, so it saves you a bit of time but it's still not exactly mindblowing. But what if the Chancellor suddenly decides to alter the rate of VAT. It will take you ages to recalculate everything by hand. But it is simple using a spreadsheet and you can have the new figures in a matter of minutes.

Then you can start making 'what if' calculations. What if I cut the price of my products but sell 10% more etc.? The spreadsheet allows you to examine the various possibilities so that you can maximise your profit.

Picture This

Unless your name is Isaac Newton or similar, given a page full of figures - e.g. a spreadsheet - most people look blank. It doesn't matter that you have everything neatly labelled or whatever, very few people can extract any sort of meaningful data quickly when it is presented like that.

Roll on the graphics package. Information can be saved from the spreadsheet for representing graphically. Typically, this will be the totals produced by the spreadsheet e.g.

monthly profit, but information can be entered directly.

There are three forms of display available to you - a bar chart, a line graph and a pie chart. These can all be labelled and you can use different types of shading to delineate the various sections. Presentation of data is becoming increasingly important. If you can show your bank manager a graph of your projected profits, he may be more willing to sift through the raw data than if you just gave him a spreadsheet and told him to draw his own conclusions.

Extras

The other two features of Mini Office II are a communications package and a label printer. The comms package can be used either via a serial modem/RS232C or Compunet. The protocols have been established for Microlink/Telecom Gold but you can establish your own protocols if you want to hook up somewhere else. somewhere else.

The label printer lets you design your own layout and size. Information can then be pulled from your database ready for printing.

Verdict

Who would use Mini Office II? It is ideal for anyone who is running a club and wants to maintain records of its members. If you are running a business, again the package is excellent but... think long and hard about plans for your expansion. If your business is likely to remain at its current level then fine, but if you intend branching out, you may be advised to invest in a more powerful micro. Not because Mini Office is no good, but because of the limitations of the C64.

The package itself is superb value for money and has got to be one of the bargains of the year.

Touchline

Title: Mini Office II. Supplier: Database Software, Europa House, 68 Chester Road, Hazel Grove, Stockport SK7 5NY. Tel: 061 456 8835. Price: £16.95 (cass) £19.95 (disk).

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Hex Data Entry II

An updated version of our machine code entry program.

By M.C. Stretton assisted by P.A. Eves

The Your Commodore Hex Data Entry program has been written with you, the reader in mind. No longer will it be a painstaking ordeal, typing in all the long list of data. This program will ensure a 100% correct entry, each and every time you use it.

It has become apparent that a number of people are experiencing problems using an earlier version of this program. The program presented here is an update of this version and cures any problems that we are aware

For your own safety, do not use the first version of Hex Data Entry.

On first entering the Hex Data Entry, only the LOAD DATA and DATA ENTRY options are available to you. This is because the buffer is empty, and the other two options require data to be present. On selecting the LOAD DATA option, you are asked for TAPE or DISK. Press either 'T' or 'D' then RETURN. The program remembers the last Input/Output, and so it is possible to just hit RETURN if the correct device type is being displayed. You are then required to enter a filename.

If you should make an error in your filename entry, you may either delete single characters by the DEL key, or SHIFT/CLRHOME will delete the whole filename. After the prompt, hit return and the file will be loaded into the buffer. The program will allow files up to 95 blocks in length to be loaded

in. If you want larger programs to be entered, you will have to split them into two or more parts first.

The SAVE option is identical to the LOAD, except that it takes the contents of the buffer and saves them out to the given start address. This will save an executable file, that can be loaded and run, independent of the Input program.

Data Entry

The Data Entry option is the option by which you can enter data from Your Commodore, or your own creations. Once this option is selected you are asked if you want to continue from the given address. If you have just 'LOADed' a file, this address will be the next available byte in the buffer. (Allowing you to add more data to the end of the loaded file). Therefore if you wish to continue typing in at the last address, type 'Y'. If 'N' is pressed the program assumes you are starting a fresh entry. When this happens the buffer is reset to zero, thus losing any program currently in memory. (I have chosen \$C000 as the normal start up address purely because most M/C progs reside here). After pressing 'N', you are then asked for the starting address, in Hex. Any valid Hex number is acceptable, e.g. \$400, \$C00, \$C0400. In this example, the first figure, \$400, would be interpreted as \$0400 by the program. Likewise \$286 is taken to be \$0286.

Once the start address is given, you are asked if you want checksums or not. If you are typing in a program from Your Commodore your response will be 'Y'.

The screen display now changes to show the current address being poked into. Type any valid Hex number and the program automatically skips the next byte without the need to type commas, spaces or returns. If you make a mistake, one press of the DEL key will erase the whole number. If in the no checksum mode, when you get to the end of the line, the line will automatically scroll up ready for your next input.

If in checksum mode, after eight bytes are entered you must type the two digit checksum at the end of the line. Unlike the no checksum mode you now press return to enter the line.

If the program finds that the checksum does not match the line entered, a warning tone will be sound. You will then be asked if you wish to either: a) Re-enter the line or b) Re-enter the checksum.

After checking your line, if you find you have entered it wrongly, then press 'L'. The line will be erased and you then re-enter it correctly. If you find that you have only made a mistake in typing in the checksum, then press 'C' and re-enter it. Should you wish to stop entering data, simply press return

or space bar on a blank line to get you back to the main menu. Here you may SAVE your program so as to restart another day, or you may wish to see a

On choosing the print option, you have a choice of hard copy or screen copy. The listing can be paused at any time by pressing down and holding down any key. Pressing the RUN/STOP key and holding it down will break out of the print mode and return you to the main menu.

The left arrow key 'top left of the keyboard', acts as zero when typing in your data. The space bar acts as the return key when entering data, thus leaving you free from searching for the return key.

I hope that this program will help to take the drudgery out of typing in long lists of data statements.

PROGRAM: HEX DATA ENTRY II

1 POKE788,52:CLR:EU=16384

OMMODORE HEX INPUTTER - (C)

14 ONFKGOSUB164,176,16,84

SA-CA

@400"

1985

RUSOFF]"

4 GOSUB212

5 PRINT"[CLR]":

JEF13 LOADS DATA"

SAVES DATA

ENTER DATA

PRINT DATA'

13 GOSUB125

16 GOSUB197

IGHT143": CAS

15 GOTO6

	_		
	104	19 IFAS="N"THENCB=16384:GDTO	I ce
	F4	20 IFAS="Y"THENPRINT"[WHITE] "::GDT024	55
	F5		DF
	72		Di.
	1	SONJDATA ADDRESS: \$ [SPC2	CC
	200	0, UP, RIGHT15]";	46
	26	OFF]";: HHS=INS: GOSUB120: SA=D	6F
		E: CA=DE: CAS=HHS: LN=0	
	15	SON, SPC43DO YOU WISH TO ENTE	02
	1	R CHECKSUMS?[SPC5, RUSOFF]";	ØB
	C7	25 POKE198, Ø: WAIT198, 1: GETAS	97
	81	26 IFAS-"N"THENCF=1:GOTO29	
	EE	27 IFAS-"Y"THENCF-0:GOTO29	SD
	F2	28 GOTO25	
	53	29 PRINT"[CLR, WHITE]";	FF
	26 F9	30 SYSS9626 31 GOSUB61	6E 67
	89	32 IN\$=""	AE
	24	33 GOSUB125	CC
	DD	34 L=LEN(INS)	behe
	B4	35 IFAS=CHRS(20)THENGOSUB57:	
	-	GOTO33	
	D1	36 IFAS-CHRS(13)ANDRE-ØTHENP	F5
	C9	RINT"[CLR]":RETURN 37 IFAS=CHRS(32)ANDBE=ØTHENP	
	65	RINT"[CLR]": RETURN	A2
	46	38 IFAS="+"THENAS="0":GOTO42	ME
	A5	39 Y=0:IFASC(A\$)>47ANDASC(A\$	84
)<58THENY=1	67
	18	40 IFASC(A\$)>64ANDASC(A\$)<71	BC
-	1	THENY=1	69
ı	55	41 IFY=ØTHEN33	A6
ı	60	42 PRINTAS; : DN=DN+1: IFDN=2TH	00
ı	000	ENPRINT" ";:GOTO44	
ı	A9 79	EEDTOD: AS-ENI EP 44 INS-INS+AS	74
ı	26	45 HH5=IN5:GOSUB120	
ı	D1	46 POKE CB, DE: CA=CA+1: CB=CB+	
ı		1:DN=0:BE=BE+1:IN\$=""	DD
ı	7B	47 IFBE=BANDCF=1THENGDT030	
ı	39	48 IFBE-BANDCF-ØTHENPRINT"CR	1E
ı		IGHT3)";:GOSUB71:GOSUB65	F3
ı	FF	49 IFBE-BANDCCS-UCSTHENGOTO3	EØ
ı		Ø	29
ı	25	50 IFBE-BANDCCS<>UC\$THENGOSU	35
ı		B202:GOTOS2	
ı	DE	51 G0T033	D6
ı	5A	52 LN=LN-1:ONEFGOTO56,53	
ı	36	53 PRINT"CHOME, WHITE, DOWN24,	30
ı		RIGHT371";	BE
ı	29	54 PRINT"CLEFT5]";	
ı	CA	SS GOTO48	40
ı	DB 41	56 CB=CB-B:CA=CA-B:GOTO31 57 IFBE=ØTHENGOSUBS9:RETURN	64
ı	10	58 IFDN-ØTHENPRINT"CLEFT3]	B1
ı	147	CLEFT2]";:BE=BE-1:CB=CB-1:CA	D5
ı		=CA-1:INS="":RETURN	D5
ı	86	59 IFL=>1THENINS=LEFT\$(INS,L	07
ı		-1):PRINT"CLEFT].CLEFT]";:DN	97
ı		=DN-1	SD
ı	B2	60 RETURN	
	F3	61 DE=CA:GOSUB113:CAS=LEFTS(DE
	01/02/10	"\$0000",5-LEN(HHS))+HHS	THE !
	FB	62 PRINT"CHOME, DOWN24, RIGHT.	F9
		WHITE]"; CAS; "[SPC4]	
			21
	BB	63 IFCF=@THENPRINT" :";	
	A1	64 PRINT"CHOME, DOWN24, RIGHT1	E3
	12024	0]";:BE=0:DN=0:INS="":RETURN	

ou or am ise to ced ind the ype vou EL fin get will our ight the the ode line. the line und. h to Reyou then and you stake press

sh to

eturn

86

70 RETURN

NDL> ØTHEN75

UCS): RETURN

) < SBTHENY=1

82 PRINTLS;

JESPC31

TEDCSPC31

NULSPC31

89 GETKS

74 G0T076

71 POKE198,0:UCS="" 72 GETLS: IFLS=""THEN72

73 L=LEN(UCS): IFLS=CHRS(20)A

75 UCS=LEFTS(UCS,L-1):PRINT" [LEFT].[LEFT]";:GOTO72 76 IFLS=CHRS(13)ANDL=2THENCK

-VAL(UC\$):RETURN 77 IFL\$=" "ANDL=2THENCK=VAL(

79 Y-0: IFASC(LS)>47ANDASC(LS

80 IFASC(LS)>64ANDASC(LS)<71

85 LN=0:GOSUB197:PRINT"[HOME

, DOWN, RUSON, BLACK, SPC31PRINT

86 PRINT"CUP2, RUSON, SPC3)BEW

ARE: ENTIRE BUFFER GETS PRIN

B7 PRINT"[UP, RVSON, SPC3]ANY OTHER KEY RETURNS TO MAIN ME

91 IFKS="S"THENNU=3:GDT096 92 IFKS="P"THENNU=4:GOT094

93 PRINT"[WHITE, CLR]": RETURN

94 PRINT"CHOME, DOWN, BLACK, RU SWITCH ON PRINTER THEN

88 POKE198,0:WAIT198,1

90 IFK\$-""THEN89

TO SCREEN (S) OR PRINTER (P

78 IFL5="""THENL5="0"

81 IFY-@ORL-2THEN72

B3 UC\$=UC\$+L\$:GOTO72

IFCA-SATHENRETURN

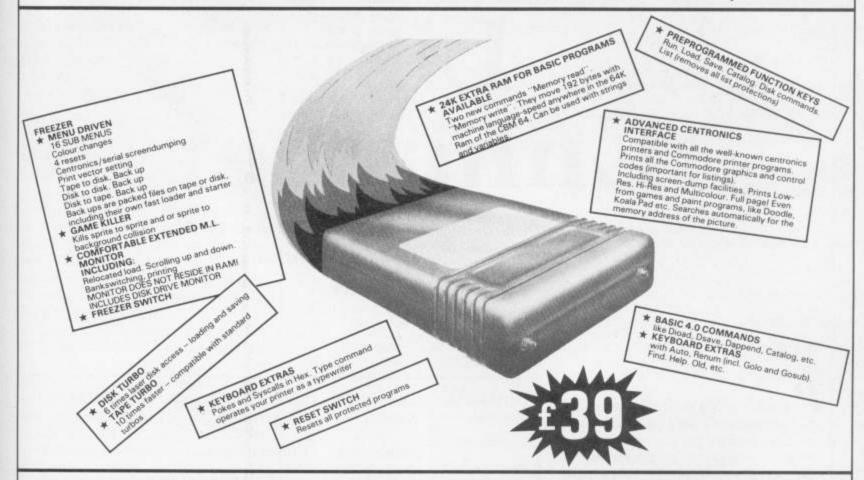
В7	120 IFLEN(HHB)<4THENHHS=LEFT S("0000"+HHB,4-LEN(HHS))+HHB	90 E6 59
30	121 A=ASC(HH\$)-48:B=ASC(HID\$ (HH\$,2,1))-48	76
88	122 C=ASC(MIDS(HHS, 3, 1))-48:	
ØB	D-ASC(MIDS(HHS,4,1))-48 123 DE-256*(16*(A+7*(A>9))+B +7*(B>9))+16*(C+7*(C>9))+D+7	A4
	*(D>9)	21
F2	124 RETURN	B6
PQ SA	125 FK=0:Q=FRE(0) 126 POKE198,0:WAIT198,1:GETA	00
	\$ 127 IFAS=CHR\$(133)THENFK=1	88
SE	1PH IFAS=CHRS(134)THENFK=2	
38	129 IFAS-CHRS(135)THENFK=3 130 IFAS=CHRS(135)THENFK=4	BØ
3C	130 IFAS=CARSCISG/INCARA 1	
F5	132 INS=""	ES.
B5	133 GETLS: IFLS=""THEN133 134 L-LEN(INS): IFLS=CHRS(20)	
1214	ANDL>0THEN136	en
43 85	135 GOTO137 136 INS-LEFTS(INS,L-1):PRINT	CD
00	"[LEFT].[LEFT]"::GOTO133	05
71	137 IFLS-CHR5(13)ANDL>ØTHENR ETURN	
85	138 IFLS=CHRS(32)ANDL>ØTHENR	04
FЗ	139 FLAG=0:IFASC(LS)>47ANDAS C(LS) <sbihenflag=1< td=""><td>87</td></sbihenflag=1<>	87
CC	140 IFASC(L\$)>64ANDASC(L\$)<7 1THENFLAG=1	73
7A	141 IFFLAG<>1THENGOTO133	D3
Ø8	142 IFL=4THENGOTO133 143 PRINTL5;	35
81 1E	144 INS=INS+LS:GOTO133	1
F9	145 FORX=1T016:POKE832+X,32:	52
39	146 PRINT"[HOME, DOWN, RUSON, B LACK]FILENAME: [[SPC16]][SPC	45
	12,UP,RIGHT111;	50
B7 55	148 GETAS: IFAS=""THEN148 *	44
CF 24	149 L-LEN(FLS)	
6.1	53	CØ
BD	151 IFAS-"CCLR]"THEN145 152 GOT0155	
08	153 FLS=LEFIS(FL5,L-1): PK101	31
	"[LEFT] [LEFT]"; 154 GOTO148	78
56	155 IFAS=CHRS(13)ANDL>DIHEN1	
78		CE SE
88	THEN148	
	158 IF L-16THEN148 159 PRINTAS;	F1 BE
91	1 1EN FIREFELENTER : DUITE : 10	
6	+X,ASC(MIDS(FLS,X,1)):NEXT	DI
05	The same of the sa	58
21	163 RETURN	
91	45	
BI	- 165 IFDU=1THENPRINT"CHOME, DO	5 7
	WN, ELACK, RUSON] PLACE TAPE IN DECK THEN PRESS 'PLAY'	7
	C51"-GDTD171	-
5	5 166 PRINT"CHOME, DOWN, BLACK, I USON3 PLACE DISK INTO DRIVE	1
	THEN HIT RETURN [CS]"	
3	5 167 POKE198,0:WAII198,1:GET 5 1686>CHR\$(13)THEN167	
4	D 168 PRINT"EHOME, DOWN, BLACK,	P 5
	USONILOADINGESPC331"	1 8

			ac.	214 PRINT"[HOME,DO
("0000"+HHS, 4-LEN(HHS))+HHS	EE.	170 SYS49244:GOTO172 171 SYS49152 172 A-PEEK(829):E-PEEK(830):	PD PD	7,CI26]" 215 READX:IFX=256T
21 A-ASC(HHS)-48:B-ASC(MIDS		PFEK(831):D-PEEK(832)	B4	216 POKE I, X: I=I+1
HH5.2.1))-48	76	173 SA=(256*B)+A:CA=(256*D)+ C:SZ=CA-SA:CB=BU+SZ:LN=INI(S	51	217 DATA 32,44,247
122 C=ASC(MID\$(HH\$,3,1))-48:		2/8)	BE	218 DATA 169,0,133
D=ASC(MIDs(HHs,4,1))-48 123 DE-256*(16*(A+7*(A>9))+B	A4	174 DE-CA: GOSUB113: CAS-LEFTS		4,133,194 219 DATA 56,173,63
+7*(B>9))+16*(C+7*(C>9))+D+7		("50000", 5-LEN(HHS))+HHS	FE	3,170
10707	DS 21	175 RETURN 176 IFCA=SATHENRETURN	47	220 DATA 173,64,3
LCT KLIUMA	86	177 GOSUB197: GOSUB188: GOSUB1	20	68,24 221 DATA 138,101,1
126 POKE198,0:WAIT198,1:GETA	200	45 178 A=SA-INI(SA/2S6)*2S6:8=I	28	152.101,194
B 127 IFAS-CHRS(133)THENFK=1	88	NI(SA/256): POKE829, A: POKE830	1A	222 DATA 133,175,
128 IFAS=CHRS(134)THENFK=2		B	2E	165,255,141 223 DATA 60,3,96.3
129 IFAS-CHRS(135)THENFK-3 130 IFAS-CHRS(136)THENFK-4	BØ	179 C=CA-INI(CA/256)*255:D=I NI(CA/256):POKE831,C:POKE832		169,0
130 TEAS-CARBCISOTINEM & 1		П	CC	224 DATA 133,193,
132 INS=""	BS.	180 IFDU-ITHENPPINT"CHOME, DO WN, BLACK, RUSONJPLACE TAPE IN	83	194,56,173 225 DAIA 63,3,237
133 GETLS: [FLS=""THEN133 134 L-LEN(INS): [FLS-CHRS(20)		DECK THEN PRESS 'REC-PLAY'L		73,64
ANDL > ØIHEN136	1000	CS1":SYS49203 181 IFDU-1THENSYS49206:RETUR	SC	226 DATA 3,237,62 38,101
135 GOTO137 136 INS-LEFTS(INS,L-1):PRINT	CD	M N	SE	227 DATA 193,133,
"[LEFT].[LEFT]";:GOIO133	05	182 PRINT"[HOME, DOWN, BLACK, R	AE	,194,133,175 228 DATA 32,124,2
137 IFLS-CHRS(13)ANDL>ØTHENR		USON3 PLACE DISK INTO DRIVE THEN HIT RETURN [CS]"	3/5	6.133,185
ETURN 138 IFLS-CHRS(32)ANDL>ØTHENR	D4	183 POKE198.0: WAIT198,1:GETA	SC	229 DATA 169,1,14
ETURN	07	5: IFAS<>CHRS(13)THEN183 184 PRINT"[HOME, DOWN, BLACK, R	36	184,169 230 DATA 8,133,18
139 FLAG-0:IFASC(LS)>47ANDAS C(LS) <sbihenflag-1< td=""><td>87</td><td>USDNISAUINGESPC341"</td><td>1.0</td><td>.195,133 231 DATA 147,169,</td></sbihenflag-1<>	87	USDNISAUINGESPC341"	1.0	.195,133 231 DATA 147,169,
140 IFASC(LS)>64ANDASC(LS)<7	73	185 PRINT"[RUSON, UP3, RIGH17]	10	169,3,133
1THENFLAG=1 141 IFFLAG<>1THENGDTD133	D3	";FL\$ 186 SYS49343	4B	232 DATA 188,169,
142 IFL=4THENGOTO133	35	197 RETURN	SE	164,183,32 233 DATA 175,245,
143 PRINTLS;	35	188 PRINT"[HOME, DOWN, BLACK, R USON] TAPE OR DISK:[SPC27]";	2.0	165,186,32
144 INS=INS+LS:GOTO133 145 FORX=1TO16:POKE832+X,32:	52	189 IFDU=1THENPRINT"[HOME, DO	F5	
NEXT		WN RIGHT14]TAPECSPC22]";	BD	9,237,32 235 DATA 19,238,1
146 PRINT"[HOME, DOWN, RUSON, B LACK]FILENAME: [[SPC16]][SPC	45	190 IFDV=BTHENPRINT"[HOME,DO WN,RIGHT14]DISKESPC22]";	-	19,238
12,UP,RIGHT113";	50	191 POKE198, 0: WAIT198, 1: GETA	9A	236 DATA 141,62,3
147 FLS=""	44	5 192 IFAS="I"ANDDU=STHENPRINT	A4	237 DATA 141,63,3
148 GETAS: IFAS=""THEN148 * 149 L=LEN(FLS)	-1.4	"CHOME, DOWN, RIGHTIY, RUSONITA	33	,233,64 238 DATA 141,64,3
150 IFAS=CHRS(20)ANDL>0THEN1	ca	PE":DV=1 193 IFAS="D"ANDDU=1THENPRINT	133	3,109
151 IFAS-"CCLR]"THEN145	CØ	"CHOME, DOWN, RIGHT14, RUSONIDI	92	
15P G0T0155		SK":DU=8 194 IFAS=CHRS(13)THENRETURN	CØ	2,3 240 DATA 109,64,3
153 FLS=LEFTS(FLS,L-1):PRINT "LLEFT) [LEFT]";	31	195 IFAS=CHRS(32)THENRETURN		5,169
154 GOTO148	78	196 GOTO191	70	241 DATA 97,133, 3,184,169
155 IFAS=CHRS(13)ANDL>@THEN1	6A	197 PRINT"CHOME, DOWNZ, SPC403	BS	242 DATA 8,133,1
156 IFAS=CHR5(32)THEN158	CE	198 CH=0:A=KB-B:FORX=1TOB	ED	3,187,169 243 DATA 3,133,1
157 IFASC(A5)<320RASC(A5)>90	SE	199 CH=CH+(X*(PEEK((PC-1)+X))):NEXT		64 183 32
THEN148 158 IF L-16THEN148	F1	PAG CH=CH+(LN*B)	CE	244 DATA 213,243 165,186,32
159 PRINTAS;	BB	201 DE=CH:GDSUB113:CCS=HIDSC HH5,3):LN=LN+1:RETURN	48	5 245 DATA 12,237,
160 FLS=FLS+AS:GOTO148 161 FORX=ITOLEN(FLS):POKE832	DD	THE PROPERTY OF STATE	-	85,237,169 246 DATA 0,133,1
+X,ASC(MIDS(FLS,X,1)):NEXT		,C0401";	100	3,173,56
162 POKE183,L	52	- PF-FNTER [WHITE]LEBLACK]]	H	4 247 DATA 173,63,
163 RETURN 164 GOSUB197:GOSUB188:GOSUB1		NE OR CWHITE JCCBLACK JHECKSUN	55	33,174 2 248 DATA 173,64,
45	-	"; 204 PRINT"CRUSOFF,CT401"	-	33,175
165 IFDV=1THENPRINT"CHOME, DO WN, BLACK, RUSON1 PLACE TAPE	75	205 GOSUB252	40	C 249 DATA 24,169, 33,175,173,61,3
IN DECK THEN PRESS 'PLAY' E	77	The state of the s	46	
C51"-GDT0171	18	POR IFAS-"C"THENEF-2		,160,0
166 PRINT"CHOME, DOWN, BLACK, R USON3 PLACE DISK INTO DRIVE	11	209 IFAS<>"C"ANDAS<>"L"THEN	2 21	D 251 DATA 32,33,0 A 252 POKE 54296,
THEN HIT RETURN [[5]	BE	06 210 PRINT"CHOME3";:FORX=1TO	3	.Ø: POKE 54278,20
167 POKE198,0:WAIT198,1:GETF 5:IFAS<>CHR\$(13)THEN167	100	:PRINT"[SPC40]";:NEXT	В	B 253 POKE 54273, ,00: POKE 54276,
168 PRINT"[HOME, DOWN, BLACK, F	SI	211 RETURN	9	1 254 FOR X=1 TO
USON 11 OAD INGESPERED"	H	PRINT"CCLR, DOWNIO, RIGHT	7	54276,0: POKE 5
169 PRINT"[RUSON, UP3, RIGHTE:	E-1	JPLEASE WAIT ONE MOMENT	20	4278,0:RETURN

1	SC	214 PRINT"CHOME, DOWN11, RIGHT
	FD	7,CI26]" 215 READX:IFX=256THENRETURN 216 POKE I,X:I=I+1:GOTO 215
	B4 51	217 DATA 32,44,247,173,60,3,
	BE	218 DATA 169,0,133,193,169,6
	FE	219 DATA 56,173,63,3,237,61,
	47	220 DATA 173,64,3,237,62,3,1
	28	221 DATA 138,101,193,133,174
	1A	222 DATA 133,175,32,162,245,
	SE	223 DATA 60,3,96.32,183,247, 169,0
	CC	224 DATA 133,193,169,64,133, 194,56,173
	83	225 DAIA 63,3,237,51,3,170,1
	SC	226 DATA 3,237,62,3,168,24,1
	SE	227 DATA 193,133,174,152,101
	AE	228 DATA 32,124,246,96,169,8
ì	5C	229 DATA 169,1,141,60,3,133,
2	36	230 DATA 8,133,186,169,0,133
1	1C	231 DATA 147,169,65,133,187,
	4B	232 DATA 188,169,64,133,196,
R	SE	233 DATA 175,245,32,213,243,
0	F5	234 DATA 9,237,165,185,32,19
0	BD	235 DATA 19,238,141,61,3,32,
A	9A	236 DATA 141,62,3,32,232,244
IA	A4	237 DATA 141,63,3,56,165,175
T	33	238 DATA 141,64,3,24,173,61,
I	92	239 DATA 63,3,141,63,3,173,6
	CØ	5 169
13	70	3 184 169
	BS	2 197 169
0		64,183,32
50		165 186 32
FF		85,237,169
)R	100000	3,173,56
	1	33 174
	55	33 175
	40	33 175 173.61.3
	46	,160,0
Nã	71	9 252 POKE 54296, 15: POKE 54277
03	B	,0:POKE 54278,200 8 253 POKE 54273,40:POKE 54278 ,00:POKE 54276,17
in the second	9	THE DOG MEYT DOVE
I		54276,0:PURE 542//,0:FURE 4278 0:RETURN

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3HT

RN 15

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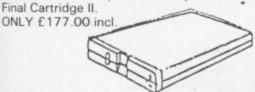
54272

POKE

POKE 5

55

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List Enhancer

This program will improve the LIST facility on your C64, almost beyond recognition.

By A.J. Barker

P age-Lister is a utility/program aid that supplements the List function on the Commodore 64.

The normal List command is adequate if you are working on a small program. With larger programs it has some drawbacks; you need to either remember line numbers or LIST all of the program up to the section on which you are currently using the CTRL key and RUN/STOP to stop the display.

This procedure is, to say the least, clumsy and inefficient – especially since it is frequently repeated during program development.

One answer to the problem would be a scrolling program lister which allows you to list both forwards and backwards through the program to the appropriate point. This is most definitely an improvement, but it would still require a line number to be typed in each time if you are not working near the start of the program.

An Alternative

The Page-Lister utility presented here is an alternative to scrolling and it is, I believe, more practical. Instead of scrolling, Page-Lister allows the program being developed to be listed as selected screens of 'pages'; stopping after each complete page. It then allows you to continue to page forwards or backwards through the program, editing as required. The size of the page is initially set to 21 lines. This may be altered, however, so that you could, if you wanted, display the program a line at a time, stopping after each line.

COMMAND +	PARAMETER Number (n)	DEFAULT (if blank) Current Page size.	DESCRIPTION Shift display forward n lines.
-	Number (n)	Current page size.	Shift display back- wards n lines.
В	None	N/A	List last page of pro- gram.
C	None	N/A	List current page.
L	Line number	0	List 1 page from line number
P	Number (n)	21	Set current page size to n.
1	None	N/A	List first page of pro- gram.

Other functions allow you to list the first or last page of the program or to shift the display forwards or backwards a specified number of lines relative to the current line number at the top of the page. You may also list a page starting from a specified line number or re-display the current page. The current page location is always remembered by Page-Lister. This means that you can work on a particular page, run the program, and then re-display the page you were working on without having to remember line numbers - a most useful development aid.

Loading and Activating

Type in the Basic loader and save to tape or disk, as usual, before running to install the machine code. Type SYS49152 RETURN to activate Page-Lister - this will cause the message "PAGE-LISTER ACTIVE" to be displayed to inform you of its current state. You will also notice that, when active, Page-Lister sets character colour to black. If SYS49152 is entered again then Page-Lister is de-activated, causing the message "PAGE-LISTER INACTIVE" to be displayed and setting character colour to blue. Now load a Basic program – preferably a large one – and activate Page-Lister before trying out the commands.

Page-Lister Commands

Page-Lister commands consist of one letter followed by an optional number, where applicable, and must be entered on a blank line (i.e. extraneous data is not allowed). The current + or -command is forced into the cursor position immediately after the READY prompt after a page has been displayed. Thus scanning forwards or backwards through the program

requires only RETURN. If you set the repeat key on (POKE 650, 128) then you can page through a large program very rapidly by simply holding down the return key.

Keeping Track

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The + command, if entered with no parameter, will move the display on a number of lines equal to one less than the current page size. This means that the bottom line of the current page is retained as the top line of the next page. The opposite is true of the command. The idea of this is to help you keep track of where you are in the program while paging.

Page-Lister is located at 49152-50042 (\$SC000-SC37A) if you wish to save it as a machine code object program. It is not re-locatable and cannot be used to list a loaded directory but it works with MIKRO assembler and so far has been compatible with the Commodore C64 DOS wedge.

AB	100 REM************

58	110 REM* PAGE-LISTER Ø
1F	120 REM* A.J.B. 22/10/86
100	
ØD	130 REM*************
100	********
SD	1000 FOR I = 49152TO 50042
ØE	1010 READ IP%
D1	1020 POKE I, IP%
88	1030 NEXT
94	1040 END
E9	1050 DATA 76,157,192,18,144,
	42,42,42,42
FD	1060 DATA 42,42,42,42,42,42,
	32,80,65
BE	1070 DATA 71,69,45,76,73,83,
	84,69,82
74	1080 DATA 32,65,67,84,73,86,
	69, 32, 42
03	1090 DATA 42,42,42,42,42,42,
	42,42,42
21	1100 DATA 146,141,18,154,42,
100.00	42,42,42,42
E5	1110 DATA 42,42,42,42,32,80,
-	65,71,69
65	1120 DATA 45,76,73,83,84,69,
	82,32,73

1130 DATA 78,65,67,84,73,86,

1140 DATA 42,42,42,42,42,42,

1150 DATA 141,0,0,0,0,0,0,0,0,

1160 DATA 0,20,0,0,0,43,157,

1170 DATA 0,0,0,141,0,0,0,0.

1180 DATA 0,0,0,0,0,67,84,66

1190 DATA 170,171,80,0,0,0,0

1200 DATA 0,0,20,0,20,0,20,0

69,32,32

42,42,146

255,255

1210 DATA 194,65,194,65,194, ,173,101,192,208 69,192,133,252 3,88,96 192,133,123,173 2,99,192,32,115 38,10,168,185 2,200,185,129,192 6F 83,193,234,224 46 Ø5 65,20,141,102 CB 192,234,169,147 E3 170,32,200,194 58 AB 74 25 95,192,142,96 33 48 BØ E6 ,237,100,192,141 4,192,234,173 144,11,208,22 ,95,192,176,13 95,192,173,94 ,173,95,192,174

21,234,173,97 65,194,83,194 1220 DATA 119,194,22,194,120 1630 DATA 192,133,95,173,98, 192,133,96,234 1640 DATA 76,201,166,234,173 1230 DATA 31,169,3,133,251,1 103,192,208,31 1650 DATA 173,102,192,240,26 1240 DATA 32,106,195,173,8,3 201,23,240,22 ,141,114,192 1250 DATA 173,9,3,141,115,19 1660 DATA 56,233,1,234,141,1 00,192,141,137 2,169,228,160 1260 DATA 192,162,255,208,19 1670 DATA 192,141,139,192,20 8,7,238,137,192 ,169,47,133,251 1270 DATA 169,192,133,252,32 1680 DATA 238,139,192,234,23 4,24,32,192,194 ,106,195,173,114 1280 DATA 192,172,115,192,16 1690 DATA 96,234,173,102,192 141,91,192,173 2,0,234,142,101 1290 DATA 192,141,8,3,140,9, 1700 DATA 103,192,141,92,192 ,32,192,194,234 1710 DATA 96,234,32,192,194, 169,43,141,104 1720 DATA 192,24,173,93,192, 1300 DATA 76,7,193,234,142,1 21,192,166,58 1310 DATA 232,208,38,165,122 109,102,192,141 ,141,116,192,165 1320 DATA 123,141,117,192,32 1730 DATA 93,192,173,94,192, 109,103,192,141 ,115,0,240,11 1330 DATA 162,6,234,221,122, 1740 DATA 94,192,173,93,192, 174,94,192,234 192,240,21,202 1340 DATA 16,247,234,173,117 1750 DATA 96,234,32,192,194, 169,45,141,104 1760 DATA 192,56,173,93,192, 1350 DATA 116,192,133,122,24 237,102,192,141 ,174,121,192,108 1360 DATA 114,192,234,234,14 1770 DATA 93,192,173,94,192, 176,12,237,103 1780 DATA 192,234,176,6,234, 169,0,141,93 1790 DATA 192,234,141,94,192 1370 DATA 0,144,22,208,188,1 ,173,93,192,174 1800 DATA 94,192,234,96,234, 96,201,7,176 1810 DATA 17,10,168,185,143, 1380 DATA 129,192,141,102,19 1390 DATA 141,103,192,234,76 192,141,119,192 1820 DATA 185,144,192,141,12 1400 DATA 2,176,2,144,161,24 ,32,107,169 1410 DATA 32,121,0,208,152,1 0,192,100,119,192 1830 DATA 56,96,234,173,91,1 92,174,92,192 1420 DATA 192,165,21,141,103 1840 DATA 234,133,20,134,21, 169,0,141,93 1850 DATA 192,141,94,192,165 1430 DATA 32,210,255,169,255 ,43,166,44,133 1860 DATA 57,134,58,234,160, 1,133,95,134 1870 DATA 96,177,95,240,54,1 1440 DATA 208,15,205,100,192 1440 DATA 208, 18, 209, 180, 180, 176, 11, 165, 43
1450 DATA 133,95,165,44,133,
96,76,195,166
1460 DATA 234,141,108,192,14
2,109,192,173,99
1470 DATA 192,32,169,194,141 65,95,133,57 1880 DATA 134,58,160,3,165,2 1,209,95,144 1890 DATA 40,240,3,136,208,9 1480 DATA 192;162,0,234,189, 104,192,205,111 ,165,20,136 1900 DATA 209,95,144,28,240, 18,136,177,95 1910 DATA 170,136,177,95,238 1490 DATA 192,240,6,157,119, 2,232,208,241 1500 DATA 169,3,133,198,173, 109,192,141,94 93,192,208,3 1920 DATA 238,94,192,76,220, 194,165,95,133 1930 DATA 57,165,96,133,58,1 1510 DATA 192,56,173,108,192 1520 DATA 93,192,176,3,206,9 73,93,192,174 5,80, PES, PS, SE1, PE ATAU 0PE1 1530 DATA 94,192,205,96,192, 34,141,93,192 1950 DATA 142,94,192,165,43, 1540 DATA 234,173,93,192,205 166,44,160,1 1960 DATA 133,95,134,96,177, 1550 DATA 234,173,93,192,141 95,240,31,173 1970 DATA 93,192,13,94,192,2 1560 DATA 192,141,96,192,294 40,28,56,173 8,191,1,665,581,68 ATAG 0881 1570 DATA 96,192,32,38,195,1 3,192,176,3 41,91,192,142 1580 DATA 92,192,165,95,141, 97,192,165,96 1590 DATA 141,98,192,234,24, 1990 DATA 206,94,192,177,95, 170,136,177,95 2000 DATA 76,49,195,169,255, 170,208,9,24 173,95,192,109 1600 DATA 100,192,141,95,192 GB 2010 DATA 160,3,177,95,170,1 36,177,95,234 144,3,238,96 2020 DATA 96,160,0,177,251,2 05,111,192,240 1610 DATA 192,234,173,95,192 174,96,192,32 2,005,225,015,5E,8 ATAU 0E0S 1620 DATA 38,195,133,20,134, 08,243,96,40

Software for sale

If you think that one of our programs looks very interesting, but you can't afford the time to type it in then our software service will help you out.

t's three o'clock in the morning. You sit at the computer keyboard just finished a marathon typing session entering one of the superb programs from Your Commodore. Your fingers reach for the keyboard and press the letters R, U and N. You press RETURN, sit back and nothing happens.

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The Your Commodore Software Service makes available all of the programs from each issue on both cassette and disk at a price of £6.00 for disk and £4.00 for cassette. None of the documentation for the programs is supplied with the software since it is all available in the relevant magazine. Should you not have the magazine then back issues are available from the following address:

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The Disk

Programs on the disk will also be supplied as totally working versions, i.e. when possible we will not use Basic Loaders thus making use of the programs much easier. Unfortunately at the moment we cannot duplicate C16 and Plus/4 cassettes. However programs for these machines will be available on the disk.

What programs are available?

At the top of each article you will find a strap containing the article type, C64 Program etc. So that you can see which programs are available on which format you will also find a couple of symbols after this strap. The symbols have the following meaning:

This symbol means that the program is available on cassette.



These programs are available on disk.

Please Note

Since the programs supplied on cassette are total working versions of the program, we do not put disk only programs on tape. There is no sense in placing a program that expects to be reading from disk on to tape.

JANUARY 1987

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MARCH 1987
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Cassettes or disks are available back to March 1986. Please ring the Editorial office (01-437-0626) for details of these.

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Bare Facts

In order to translate a screen display from one machine to another an intimate knowledge of the machine's video controller is required. We give comparisons of the video on the popular Commodore machines.

Every computer program will use the video display at some time or another. Writing a program that looks professional requires an intimate knowledge of the various functions of the computer's video controller.

This article will provide you with memory maps for the video controller of all the popular Commodore home computers.

It is beyond the scope of this article to explain exactly how how individual memory location is used. We have dealt with graphics in many articles in the past.

POKEing Around

Quite often we are asked the question, what does this POKE do or why is that POKE used? If you refer to the memory maps printed here for the video chips, and the earlier memory maps printed in the February 1987 issue you should be able to find out what most of the different POKEs perform. For example, the best way to attract anyone's attention to your display is to alter the colour of the screen display. This is extremely easy to do on all of the Commodore computers but must be approached in a different way depending on the actual computer that is being used.

To change any colour on the C64 you are required to access the video controller directly with POKE instructions. If you have a look at the memory map for this chip you will see that the screen colour is stored in memory location 53281 and the border colour is stored in memory location 53280. Pokeing a number between zero and 15 into either of the above locations will change the relevant item to the specified colour. For example:

FIGURE 1	C-16 COMMAND
	COLOR SOURCE, COLOUR, LUMINENCE
	SOURCE
	O = BACKGROUND 1 = FOREGROUND 2 = MULTICOLOUR 1 3 = MULTICOLOUR 2 4 = BORDER

POKE 53280,0:POKE53281,0

will change both border and screen to black.

When trying to convert programs to or from a C64 to any of the other Commodore computers altering the colours can become confusing. This is because the C16, Plus/4 and C128 all have Basic commands that allow you to change the colours without referring to POKEs. The syntax for the colour commands are shown in Figure 1.

Since all the above commands do is to alter the registers in the machines video chips, as you would yourself on the C64, it is possible to access the various registers yourself. If you refer to the details for the C128 and C16/ Plus/4 you will see that the colour of the border is stored in memory locations: 53280 and 65305 respectively. Should you enter the following commands:

POKE 53280,0 on the C128 or POKE 65305,0 on the C16 and Plus/4.

you will find that the border colour will change to black, just as though you had entered the relevant COLOR command.

Don't be afraid of POKEing around in memory to see what effects can be achieved, the worst that you can do is crash your Computer so that you have to reset it.

VDC - C128 80 column controller	Reg No	Bit	Description
This chip has 36 internal regiesters that cannot be accessed through normal POKE commands. To manipulate any register within this chip you must:	1		Horizontal Total - ie the total number of characters per line Horizontal Displayed - The number of actual characters per line
A) If you wish to write to the chip: Write the register number in address \$D500.	3	7-4	Horizontal Sync - position of left hand border Sync Width Vertical sync pulse width
Write the new value in \$D601. B) If you wish to read a register: Write the register number in \$D600. \$D601 now contains the value in that	4	3-0	Morizontal sync pulse width in characters Vertical Total - number of

register.

-		Name and the contract of the c	2244		There are a service and a service	27	10.00	anapper coldeb to temperature
5	4-0	Vertical total adjust Fine adjustment for No 4.	19		UPDATE ADDRESS - low byte of above	27		aracter width is increased should contain the number of
6	1 10	Vertical Displayed - Number	50		Attribute memory high byte			that need to be added to each
		of representable characters	51		Attribute memory low byte			oter row in the video RAM
9		Top border position	22		Character width	28	7-5	Address of character
В		Interlace		7-4	Total number of displayed			generator
200	1-0			0.000	horizontal lines		4	Ram type
	1.0	Ol interlace sync mode		3-0	Number of displayed lines	29	4-0	Character line in position an
		11 interlace sunc and video	23		Character height			underline should take place.
		mode			No of vertical lines			Usually 8
9	4-0	Number of raster lines per			displayed	30		Number of characters to be
		character	24	6	Reverse screen			written to the update
10	6-5	00 - steady cursor		4-0	Scroll screen vertically			address. If COPY set then
		01 - cursor off	25	7	O=Text mode enabled			this contains the number of
		10 - fast blinking cursor			1-Single dot graphics enabled			characters to be written into
		11 - slow blinking cursor		6	1-Colour comes from attribute			the update address
11	4-0	Line at which cursor will			RAM	31		Holds the data to be written
		stop			O=In monochrome			to a memory location. If a
12		Start address of video RAM -		5	1-Space between two			memory location is read then
		high			characters is filled with			the contents will appear
13		Start address of video - low			colour of last character			here.
14		Cursor position high byte			O-Space is Filled with	35		Start address of block to be
15		Cursor position low byte			background colour			copied - high byte
16		Light pen vertical position		4	1=Characters appear in double	33		Low byte of above
17		Light pen horizontal position			width	34		Display enable begin
18		UPDATE ADDRESS - the high		3-0	Horizontal smooth scrolling	35		Display enable end
		byte of any address to be	56	7-4	Foreground colour	36	3-0	Rate at which the VDC memory
		manipulated by the UDC		3-0	Background colour			must be refreshed.

-		STATE OF THE STATE						
Hex	Bits	Description		0	1-Enable sprite O	D01D		Sprite horizontal expansion
0000		Sprite O X position bits O-		1	1=Enable sprite 1		0	1=Expand sprite 0
		8		2	1=Enable sprite 2 stc			horizontally
0001		Sprite O Y position bits O-	0016		VIC control register		1	1=Expand sprite 1
		В		4	1=Multi-colour made on	112222		horizontally etc.
2000		Sprite 1 X position bits 0-		3	1-40 column text	DOIE		Sprite vs Sprite collision
		В			D=39 column text			detection. If a sprite is
0003		Sprite 1 Y position.		5-0	Smooth scroll to X			touching a sprite the bit
10004		Sprite 2 X Position			position.			for that sprite is turned on.
0005		Sprite 2 Y position	0017	144	Sprite vertical expansion	DD1F		Sprite Vs Background. If
0006		Sprite 3 X position		0	Expand sprite O vertically	DUAL		sprite has hit text or
0007		Sprite 3 Y position		1	Expand sprite 1 vertically			background relevent
0008		Sprite 4 X position		5	Expand sprite 2 vertically			register is set.
2000		Sprite 4 Y position	max m		etc.	0500		Border colour (dec =
DODA		Sprite 5 X position	0018		Vic memory control	2000		53280)
0008		Sprite 5 Y position Sprite 5 X position		7-4	Video matrix base address	1500		Background colour (dec =
DDDC		Sprite 6 Y position	0019	3-0	Character set base address	and a		53281)
DOOE		Sprite 7 X position	1019	7	VIC interrupt flags Set on any VIC IRD	2500		Multi-oplour 1
DOOF		Sprite 7 Y position		-	condition	0053		Multi-colour 2
0010		9th bit of sprite X co-		3	Light pen triggered bit 7	D024		Multi-colour 3
0010		ordinate		2	Sprite vs Sprite triggered	0025		Sprite multi-colour 0
	0	Sprite 0		100	bit 7	D058		Sprite multi-colour 1
	1	Sprite 1 .		1	Sprite vs Background	0027		Sprite O colour
	2	Sprite 2 stc.			triggered bit 7	D028		Sprite 1 colour
0011		UIC control register		0	Raster compare triggered	5000		Sprite 2 colour
	7.	Raster compare register bit			bit 7	D02A		Sprite 3 colour
		9	D01A		VIC interrupt switches	DOSB		Sprite 4 colour
	6	1-Enable extended colour		3	1=Enable light pen	DOSC		Sprite 5 colour
		text mode			interrupts	0050		Sprite 6 colour
	5	1-Enable bit-map mode		5	1=Sprite vs sprite enabled	DOSE		Sprite 7 colour
	14	1-Slank screen to border		1	1=Sprite vs background	62.25		
		culour			enabled	0030		C1SB ONLY SWHZ
	3	1-25 row text display, 0-24		0	1-Raster compare enabled		0	Determines if the C128
		row text display	D01B		Sprite priority registers			operates at 2MHz or 1MHz.
	5-0	Smooth scroll to Y dot		0	1=Sprite O passes in Front			If the bit is set then
		position		111	of graphics			there is no access to the
2100		Raster compare register -		1	. 1=Sprite 1 passes in front			VIC chip and the C128 operates in 2MHz mode.
		position of rester on	DOLG		of graphics etc			
main		screen	DO1C		Sprite multi colour select			Your Commodore July 1986 demonstrated how this could
0013		Light pen X position		0	1=Sprite O is multi-colour			be used to speed up a C128
0014		Light pen Y position Enables or disables sprites		1	1=Sprite 1 is multi-colour etc			in C64 mode

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Hex	Bit	Description		1	1-Synchronize voice 1 with the frequency of voice 3	DHOB		width Voice 2: Control Register
0040		Voice 1: low byte of		0	1-Start attack, decay,	1700	7	1-Random noise on
		frequency			sustain		6	1-pulse waveform on
101		Voice 1: high byte of			O-start release		5	1-Sawtooth waveform on
		frequency	0405		Unice 1: attack / decay		4	1-Triangle waveform on
504		Voice 1: Low byte of pulse		7~4	Attack cycle duration		3	1-Disable oscillator 1
District.	65271	width	-	3-0	Delay cycle duration		2	1-Ring modulate oscillator 2 with oscillator 1
0403	3-0	Voice 1: high byte of pulse	0406	7.11	Voice 1: sustain / release		1	1=Synchronize oscillator 2
Min Man		width		7-4	Sustain cycle duration Release cycle duration		*	with oscillator 1 frequence
1904	-	Voice 1: Control Register 1=Random noise on	D407	3-0	Voice 2: low byte of		0	1-Start attack, decay,
	2	1=Pulse waveform on	0407		Frequency			sustain
	5	1-Sawtooth waveform on	D408		Voice 2: high byte of			O-Start release
	4	1=Triangle waveform on			Frequency	D40C		Voice 2: attack / delay
	3	1=Disable voice 1	0409		Voice 2: Low byte of pulse	2000	7-4	Attack cycle duration
	2	1-Ring modulate voice 1			width		3-0	Delay cycle duration
		with voice 3	D40A	3-0	Voice 2: high byte of pulse	D40D		Voice 2: sustain / release

YOUR COMMODORE june 1987 89

	7-4	Sustain cycle duration			3 with oscillator 2 output		3	1=External input to filter
	3-0	Release cycle duration		1	1=Synchronize oscillator 3		5	1-Voice 3 to filter
DYOE		Voice 3: low byte of			with the frequency of		1	1=Voice 2 to filter
		frequency			oscillator 2		0	1-Voice 1 to filter
DHOF		Vaice 3: high byte of		0	1-Start attack, decay,	D418		Filter volume and mode
		frequency			sustain		7	1=Turn off voice 3 output
0410		Vaice 3: Low byte of pulse			O-start release		6	1-High pass filter on
		width	D413		Voice 3: attack / delay		5	1-Band pass filter on
D411	3-0	Voice 3: high byte of pulse		7-4	Attack cycle duration		4	1-Low pass filter on
		width		3-0	Delay cycle duration		3-0	Output volume
0412		Voice 3: Control Register	D414		Voice 3: sustain / release	D419		A/D convertor for paddle 1
	7	1=Random noise on		7-4	Sustain cycle duration	D41A		A/D convertor for paddle 2
	6	1-Pulse waveform on		3-0	Release cycle duration	D41B		Produces random number when
	5	1=Sawtooth waveform on	0415	5-0	Filter cutoff - low nubble			vaice 3 set to noise
	4	1=Triangle waveform on	D416		Filter cutoff - high bute	D41C		Output of voice 3 envelope
	3	1-Disable voice 1	D417		Filter control			generator
	5	1=Ring modulate oscillator	20150	7-4				Telli i contine

Hex	Bit	Description		14	Timer 2 interrupt		2	1=Characters From ROM
FFOO		Timer 1 law.		3	Timer 1 interrupt			O-Characters from RAM
FF01		Timer 1 high		1	Raster compare has occured		1-0	Voice 1 frequency bits 8-9
FF02		Timer 2 low	FFOA		Interrupt enable	FF13	7-3	Address of characeter set
FF03		Timer 2 high		5	1=Enable timer 3		5	1-Lower case
FF04		Timer 3 low		4	1=Enable timer 2	FF14	7-3	Address of colour memory
FFOS		Timer 4 high		3	1=Enable timer 1	FF15	6-4	Luminance of background 0
FF06	6	1=Extended background mode		1	1=Enable raster compare		3-0	Colour of background O
		on		0	Bit 8 of raster comparison	FF16	6-4	Luminance of background 1
	5	1=Bitmap mode on	FFOB		Raster comparison bits 0-7		3-0	Colour of background 1
	4	Screen off	FFOC	7-2	Not used	FF17	6-4	Luminance of background 2
	3	25 or 24 lines on screen		1-0	Bits 8-9 of cursor position		3-0	Colour of background 2
		(0=24)	FFOD		Bits 0-7 of cursor position	FF18	6-4	Luminance of background 3
	2-0	Vertical smooth scroll	FFOE		Frequency of voice 1 (bits		3-0	Colour of background 3
		position			0-73	FF19	B-4	Luminance of border
FF07	7	RVS-Video	FFOF		Frequency of voice 2 (bits		3-0	Colour of border
	6	PAL/NTSC mode (O=PAL)			0-7)	FF1A	1-0	Bits 8-9 of bit map reload
	5	Freeze mode (1-on)	FF10	1-0	Frequency of voice 2 (bits	FF1B		Bit map reload of character
	4	Multicolour made (1=an)			8-9)			position bits 0-7
	3	40 or 38 calumns (0=38)	FF11	7	Disable sound	FF1C	0	Bit 8 of raster row
	5-0	Morizontal smooth scroll		6	1=Noise on voice 2	FF1D		Current raster row bits 0-7
		position		S	1=Rectangular on voice 2	FF1E		Current raster column bits
FFOB		Keyboard matrix		4	1-Voice 1 enable			1-8
FF09		Interrupt control		3-0	Volume - O=off, 15=loud	FF3E		ROM select when written to
	5	Timer 3 interrupt	FF12	5-3	Bitmap address bits 13-15	FF3F		RDM out when written to

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C64 Teletext

Most people imagine that Teletext is merely a sports results and weather forecast service. With the C64 adaptor from Microtext, it can be much more.

By Mike Roberts

Teletext on computers such as the BBC has been common for some time. But only now can the humble Commodore owner access the cheapest general purpose database around.

Background

Many years ago before home computers were the reality that they are now, it was still obvious that there would be a need for a public computer service. The original videotext concept was designed with the paged system of showing information on individual pages with subsiduary frames for extra information. From the start it was to be a colour system and people would be charged for using the information.

The video standard chosen was now the familiar 40 x 24 Teletext graphics system. At about the same time however, meetings were going on to create a unified teletext system based around similar ideas except that the screen would be format based around a 32 column format. In a mad fit of standardization, both these groups met and adopted the videotext system. The name Videotext was then adopted to cover both services.

In Use

The format of teletext is dramatically simple and is one of the best system analysis jobs that I have ever seen. A remote keypad is used to key in a three digit number from an initial menu. The first menu leads to subsiduary menus or to the information required. The page can also be accessed directly if the number is known or by looking on the index. Once a page has been selected it can flick through a number of frames.

The transmission time aspect is important. Depending on the service, between two and five frames are transmitted per second. So when you type in your page request you have to wait a few seconds for it to appear. So you acess the page number, read the screen and, every 30 seconds, the page will change to the next frame as they cycle around. If you want the page to stay longer then you can 'hold' the page so that it will not be updated until you want it to. Alternatively, you can ask for an update which will put the normal TV picture back on to the screen until a new frame has been received when it will automatically be put up on to the screen.

The Commodore Connection
BBC micros (as usual) had the first

erack at Teletext with the incredibly expensive Acorn Teletext adaptor. However, this was the first case that, if the Acorn software failed to work, the user could just download the patch to fix it from the TV. This downloading is potentially the most interesting thing about Teletext — think of each screen as 1K of information, then think of a data rate of one Megabyte per second.

When Channel 4 started to use a system very similar, they couldn't use the BBC system. So a Spectrum Teletext adaptor was commissioned and Teletext programs transmitted for it.

Somewhere though, in the dash to bring out Teletext adaptors for the cheapest and most expensive computers on the market, one of the best — the Commodore 64 — was left out. Microtext has sought to remedy the situation.

Nowadays the page acquisition circuits are all self contained in mass produced chips. The main problem is interfacing them and building the extremely good tuner that a teletext pickup requires — ever seen a portable with a loop ariel with teletext? The graphics picture is also another problem — but not with modern home computers.

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YOUR COMMODORE june 1987

C64 Adaptor

The Microtext Teletext adaptor gets around the greatest problem, that of a tuner, by using a video recorder. No, you don't get one in the package, but you do get six foot of cable. The cable connects to the normally unused video out socket to the video recorder. This connection puts out a good composite video signal of whatever the video is tuned to. This can also be connected to a Commodore monitor.

Most video recorders have either a phono or BNC connector on them. The supplied cable has a phone connector on the business end and a BNC adaptor. So there should be little connection difficulty. However, having an all singing, all dancing, stereo/RGB/digitally tuned/state of the art etc. television, my direct video connection was already being used and I had to disconnect the TV from the video via this route and use the normal RF connection to get the video to talk to the TV again.

However, if you know enough about TV/video hook ups to get a direct video connection going then you should appreciate and understand the problem. If you look behind your TV and can only count two wires (power and aerial) going to it then you're alright. If you've got five or so (like mine) and don't know why then get help. Microtext say that they are bringing out a separate tuner in the near future that will alleviate all these problems.

All this said and done it is easy to connect the box to the wire, the wire to the video, and the box to the Commidore 64. From here you load the tape into the computer and away

The adaptor has most of the functions of a normal TV adaptor and one or two more that it is sensible to have. To change channel you use the channel selector switch on the video, pages are selected by just typing the number in. Standard functions included are Reveal - that puts on the screen information that is usually hidden, such as the answers to a quiz and Hold, freezing a page until it is read

Usual functions such as Expand, which zooms in one the top or bottom of the screen, Update, which was described earlier, and mix are not present - though there are good reasons for it. Expand is to let you read the display easier at distance, TVs are usually watched from across a room. A computer monitor is not usually set up in this way. However, if it was being used in a Teletext application a normal TV would be used, in which case

normal Teletext rules apply.

Update and Mix are not present becuase you can't mix a normal TV signal in with the Commodore 64's output so there is no need for them. The final missing command is TCP, or time control program. This is where you can program your Teletext adaptor to put up a page on the screen at a specified time. This is again normally used to remind you of something when watching a normal programme on TV. Though I wish it could have been included.

There are a lot of extra commands though. You can call up the next or last page, of limited use but nice anyway. Save and Load will perform those functions to disk or tape and would be expected in a package of this type as memory saves are awkward on a Commodore as it is. The last extra command is the best of all, allowing you to pring a page on to paper.

The Package

The Software is more in the form of an operating system than of a program. There are two parts to it. The first is a Basic program that provides all the above functions, and the second is a collection of machine code routines that actually do all the hard work like accessing the screens.

Both programs are unprotected and the Basic portion is documented by REMs telling you what parts do what, making it easily customised. Both programs are easy to save to disk or tape. The machine code section even has a routine to save itself.

The manual is a marvel of documentation, afte a quick overview of the system that explains a bit about Teletext and the way it is used, the software is fully explained. Teletext is largely self documenting and has help pages on it.

As well as explaining all the system calls to access the machine code, three example programs are included that expand the system slightly, for instance accessing and printing out the TV times for the evening. There is also a patch on to the main program that provides a screen dump on to a daisy wheel printer.

Applications

Once you've got the hang of Teletext, and that's not difficult, you can do what you like. The adaptor can be programmed to do almost anything. Just think, a database with most of the information that you would never need to access on Prestel, plus some more that's constantly updated. No line charges, no page charges, no modem with indifferent software that ties up a phone line for hours.

Applications that Microtext knows of in use include, reading the football results directly into a pools predictor program to keep it updated, and a program that analyses weather trends

by reading the weather map.

I know of someone with a BBC micro that wakes itself up, prints out the news and TV information, then wakes up his owner ready for his just printed newspaper to read on the train and remember the news is only minutes old, not up to 18 hours like a normal hot lead and newsprint.

Conclusion

I've been using Teletext for nearly four years now. As a result I don't buy newspapers and I don't buy any of the TV listings magazines. The few pounds extra on the price of a TV set is easily worth having the extra facilities.

When I first started using the Microtext adaptor I thought that all there was to Teletext was what I'd already been using, how wrong I was. With computer control, and a computer contolled tuner and eight Teletext channels to read off, I can use Teletext as no-one ever intended. The adaptor is good and produces less errors than my normal Teletext set and the software is excellent and easy to

The initial price looks daunting when compared to the price of a Teletext TV set, but think what the price of a Modem, good software, and line charges would be after a few months. This then becomes a lot cheaper.

Teletext has become my main source of information, if I need any, my handset bleeps purposefully. Now with computer control the sky's the limit. I wouldn't hesitate to recommend this to anyone.

Touchline

Microtext: 7 Birdlip Place, Horndean, Hants, PO8 9PW, Tel: 0705 595794.

Cedit

We provide cassette modifications for our character editor.

By Brian Rhodes

edit 64 is proving an extremely popular program amongst our readers. Unfortunately we aren't able to bring you more detailed instructions as promised in this issue, however the changes required for cassette users are presented here widening the appeal of this superior character editor.

The Changes

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All of the changes required are extremely simple. Even if you are a disk user then it is probably worthwhile making the changes to your program since it allows you to select between tape and disk at will. You never know when you might need to SAVE something out to cassette.

The major change to the program is the CHAR ED LOAD routine. This program has been altered quite a lot. The new version of the program has been printed here.

The CHAR ED M/C LOAD program needs a very minor change to its very last line, 1040, this should be changed to:

1040 SAVE "CHAR CODE", I

A number of lines need to be added to the CHAR BAS program, and several modifications are also made to some existing lines.

All of the necessary changes and additions are presented here and should cause no problems.

REMEMBER when using cassette the programs should be SAVEd in the following order:

1) CHAR ED LOADER 2) CHAR CODE - created when you RUN the CHAR ED M/C LOAD program.

3) CHAR BASIC

It is important that you give the programs the correct names or the program will not work.

PROGRAM: CHAR ED LOAD

- 10 REM CHARACTER EDITOR LOAD EC
- 1F 20 Qs=CHRs(34):DEV=PEEK(186)
- BE 30 POKE53281,6:POKE53280,14
- 40 PRINT"[CLR, BLUE]POKE43, 1: 56 POKE44,65: POKE16640,0: NEW"
- 50 PRINT"CDOWN2]LCSO] "Q\$"CHA 23 R CODE"QS", "DEV", 1"
- 55 IF DEV=1THEN PRINT 50
- FB 60 PRINT"[DOWN4]NEW"
- 70 PRINT"[DOWN2]L[SO]"Q\$"CHA E5 R BASIC"QS", "DEU
- 75 IF DEV=1THEN PRINT 60
- 80 PRINT"[DOWN4]RUN:[SPC3,WH 69 ITEILOADING : CHARACTER EDIT DR"
- 90 PRINT"[DOWN2, SPC12] WRITTE 55 N BY BRICBLUEJ'
- AF 100 POKE198,6
- ØB. 105 IFDEU=1THENPOKE198,8
- 110 POKE531, 19: FORK=632T0639 5A : POKEK, 13: NEXT
- F8 120 END

CHANGES TO CHAR BASIC

- SE 405 PRINT"[SPC7, RED]F2[BLUE, SPC5 ITAPE"
- 416 IFQ\$="[F1]"THENPOKE49197,8:P DD OKE49469,8: DEV=8: GOTO442
- 417 IFQ\$="[F2]"THENPOKE49197,1:P B5 OKE49469,1:DEV=1:GOTO442
- OF 442 IFDEV=8THENOPEN2,8,15
- 444 PRINT"[CLR, SPC16]STORAGE" CO
- 446 PRINT"[SPC16,CT7]" D7
- 5F 455 IFDEV=1THENGOTO468
- 82 500 IFDEV=8THENGET#2,C\$:PRINTC\$; : IFC\$<>CHR\$ (13) THEN500

A world of information at your fingertips

The Microtext adaptor turns your C64 or 128 into a sophisticated Teletext Receiver. Giving you a full colour display of any of the free pages from Ceefax or Oracle. Teletext is constantly updated to give you the latest information available. As well as news and sports results, there's road, rail and air travel information, what's on TV and weather reports. You can get an update on share prices or bargain holidays, at the touch of a button. And not only does Teletext cater for special interests, like computing, motoring, or gardening, but you'll also find things to do and places to go in your area, prize competitions and even your daily horoscope, plus much much more. It's all free, easy to use and it's all at your

With the Microtext Adaptor a page like a recipe or a software review may be saved to disc or cassette for later reloading, or you can print a page like the TV programme times on any printer which uses the serial bus. All the functions like Hold, Back one page, or Print are simply selected by pressing one key, it's very

easy to use but powerful too!

The manual has examples and shows how to access and use Teletext from your own programs, the ability to tap the massive database available on Teletext and select and use information like football results, exchange rates or weather conditions, provides

possibilities limited only by your imagination.
The Adaptor is cased and fits neatly on the User port, it comes with software on cassette with instructions for copying to disc. A lead which could be extended to another room, connects to the seldom used 'VIDEO OUT' socket on your video recorder so using your video as the Tuner for the system. This ingenious concept means an extra aerial is not required, your family can still use the Main TV as before and channel selection for Teletext is done on the video which reduces the complexity of the adaptor so saving you money!

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Analyser

Machine code programs are difficult to write, however debugging them can be even more of a problem. This program for your 128 provides some useful facilities to make this task easier.

By R. Assenheim

The problem with machine code programs is that once designed and coded, they never work. If you have designed a particularly long piece of work, then it is a long and complicated job trying to debug the program.

This program is designed to aid programmers in debugging their m/c programs.

Loading and Running

Once you have typed in the loader, the Basic program will save a copy of the program on disk under the name 'ANALYSER'.

Once this is done you can either run it in BANK 0 or 1. First load the ANALYSER either from the MONITOR or from Basic using the BLOAD command. The program MUST be loaded at address EA00, so for example if you want to load the ANALYSER in BANK 1 from the monitor then type:

L "ANALYSER",8,1EA00 or L "ANALYSER",8

for loading into BANK 0. If you don't have a disk then you will have to save the ANALYSER yourself using the MONITOR, with the command:

S "ANALYSER", 1,1EA00,1FEB0

after running the loader. (Don't forget to delete the BSAVE command in the loader.)

Load the program in as above, but just replace the 8 with a 1.

As the program can either run in BANK 0 or 1 this gives plenty of scope for other programs to run.

Once Loaded

The way this program works, is to allow the programmer to place 'breakpoints' in a machine code program. When the processor, as it is stepping through a machine code program, reaches one of these breakpoints, an interrupt occurs and control is then returned back to the ANALYSER. This allows the programmer to use the functions available either in the Analyser or the monitor, to see if the program is doing what it should. These breakpoints don't affect how the program runs, and it is possible to restart execution from one of these and the 8502 will continue as though nothing has happened.

The advantage of this is not only to see what is happening at that point in the code, but you are also allowed to change the situation so as to test the program response to different circumstances. This is invaluable when designing a bug-free program.

Another useful feature of this program is that when you are debugging a machine code program, and something does go wrong, then pressing RUN/STOP will exit this program and return you back to the Analyser command line, however, there is a danger when using this with the TRACE facility, but this is described later.

The commodore key can be used to slow output to the screen, but DO NOT use the NO SCROLL key as this will cause the whole system to lock.

Two further features included are a USER INTERFACE and the ability to define how information is output.

The USER INTERFACE is a relatively simple one. You enter a

command and supply parametric data with this command.

There are two ways of supplying the parametric data. Either you can let the Analyser prompt you for the required information, or you can skip all the prompting, and just supply all parametric data straight after the command word, and then press enter.

Just press enter on a prompt to terminate the interaction between you and the system and the system ignores all previous input for the command.

The ability to define information output is very useful. Since a machine can access the screen directly, you may be designing a screen of some kind within the program. You don't want the Analyser just displaying information anywhere, and messing up the screen, and perhaps covering a point on the screen you particularly want to see.

The next section describes the available examples on how to use them.

BP

This is used to set a breakpoint at an address either in Bank 0 or Bank 1. When program execution hits the address specified, it returns control back to the Analyser, listing any information required.

The parametric data required is:

ADDRESS of breakpoint (only possible in BANK 0 or BANK 1). TURNING ON or OFF a breakpoint. If TURNING ON then - LIST MEMORY or REGISTERS (if required).

Example 1 BP



ADDRESS ... 02000 ON/OFF ... ON LIST/NOLIST (N/L) ... L TYPE (A/R) ... A ADDRESS ... 00100 LENGTH ... 30 MODE (H/D/C) ... D

Note

Typing N will stop further prompts. A=address, R=register, H=hex, D=dec, C=char.

Example 1 sets a breakpoint at address 2000 in BANK 0. When the 8502 gets to this address in this bank, you are returned to the command line of the Analyser and the first 30 bytes from address 0100 in bank 0 are displayed in decimal.

The address is given in five bytes, the first byte being the BANK and the next four bytes being the ADDRESS. Please note that the BANK can ONLY be 0 or 1. If you specify a different bank then the system will decide whether it is part of BANK 0 or 1 and then use that RAM BANK.

If no BANK is given, then BANK 0 is the default.

The BANKS are defined the same way as the bank command available in

As you get more experienced with this program, the above example could be entered on one line:

BP 02000 ON L A 00100 30 D

You can only have 11 breakpoints set at any one time.

For the more curious, the way breakpoint works, is to place a hex '00' (i.e. a BRK command) at the address specified. When the PC reaches this address it generates an interrupt. This interrupt is detected, and so the breakpoint routines are run.

If you disassemble an address where you have placed a breakpoint, it will be different as the the Analyser changes the code at that point by placing 00 at the address. OFF will replace the code. You MUST place a breakpoint on a COMMAND boundary for it to work.

COLOUR

This allows the user to change the colour of the border, background, colour of cursor, and colour of output

text. The system will prompt for required parameters.

Example 2 COLOUR 9 0 4 7

This sets border colour to brown, background colour to black, cursor colour to yellow and character colour to purple.

The colour definitions are in the same order as in Basic, but the starting value is 0 not 1.

The program won't let you define the cursor colour (input ink) to be the same as the background colour (paper). This stops you from setting up a situation where you can't see what you are typing in. If you forget the order, just type 'COLOUR' and the Analyser will prompt you for the required information.

DELAY

This slows down execution of the program being debugged when using the TRACE facility: 1 = fastest and 255 & 0 = slowest.

Example 3 DELAY 50

DELAY AMOUNT (0...255) ...50

END

This ends the Analyser, removing all breakpoints and IRQ vector changes. You are then returned to the MONITOR.

Example 4 END

GO

This command is used to restart execution from the last breakpoint encountered which has been set up by the Analyser.

The program will start as though no stop has been encountered. This is useful if you want to change the conditions at a certain point. You would do this by setting a breakpoint at an address, and when it stopped, you could change memory or registers using the monitor (see later on how to enter the monitor).

Example 5 GO

HELP

This lists all commands available to the user.

Example 6 HELP (or just press the HELP key)

IRO

The trace facility requires the use of the IRQ vector for it to work. This means that the vector is redirected. If the program you are trying to debug also requires the use of the IRQ vector, then the TRACE facility is lost. However, if you stop your program from changing the vector, and then use this command to route the IRQ vector to the address of your interrupt routine, then the TRACE facility can still be used and whenever an interrupt occurs, your routine will be called. Please note that if you don't return to the usual KERNAL IRQ routine after processing the interrupt, then the GRAPHIC command facility will not be available to you.

Example 7 IRQ FFA65 (first byte is the bank)

IRO

Current address=FFA65 new address=xxxxx

Just pressing return here will exit this command without any changes. Otherwise, just enter the new address. Again the default bank is BANK 0.

JUMP

Similar in use to the 'G' command in the monitor, this allows the facilities of the Analyser to be used on the program to be debugged.

Example 8 JUMP 02000

This causes the program counter to start executing in BANK 0 at address 2000.

You can jump to any of the 16 BANKS and this is the running bank until changed by the program to be debugged.

If only the address is entered, then the BANK defaults to 0.



LIST

This command will LIST an area of memory of a register.

Example 9 LIST type (a/r) ... A address ... FA000 length ... 50 mode (h/d/c) ... H

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A stands for address. Address to list from F is bank 15. Number of bytes to list in DECIMAL, max=255. H=hexadecimal, D=decimal, C=character.

Example 9 is similar to typing: MFA000 FA031.

Example 10 LIST type (a/r) ...R register ... X mode (h/d/c) ... D

Note

Choices are A=accumulator, X=X register, Y=Y register, S=STATUS register, P=stack pointer.

Example 10 lists the contents of register X in decimal.

This command is usually used only in conjunction with the BP command, as described in the 'BP' command description above.

MON

This switches to the monitor. Command 'X' will return you to Analyser command line.

All commands in the monitor are available, but to use the Analyser properly, it is better not to use the G command, but the 'JUMP' command in the Analyser.

You can change memory, or change registers so that, on a GO or JUMP command, these will be the new values used.

DO NOT try to change the BANK in the monitor as this could have unpredictable effects.

Example 11 MON

PRINTER

This allows certain information to be displayed on the printer. The only information that is listed to printer is: 1. the list information when a

breakpoint is encountered.

The TABLE information. 3. The information from the HELP command.

4. The WHERE information.

The LIST information from the LIST command.

The TRACE data CANNOT be put to printer because of the nature of the KERNAL software that drives the serial bus.

Example 12 PRINTER ON (output to printer). PRINTER OFF (output to screen < ----default).

RESET

This will reset all screen definitions i.e. it will remove GRAPHIC and WINDOW facilities.

Example 13 RESET

SPLIT

This command is useful if the program to be debugged prints to the screen using the KERNAL print routines. It will divide all program output to the tophalf of the screen, and all Analyser output to the bottom half of the screen.

You specify the proportions for output.

Example 14 SPLIT 18

Will let the first 18 lines of the screen to be used by the program being debugged, and the other six lines used by the Analyser. The RESET command clears this feature.

TABLE

This lists all the breakpoints set at present whether the TRACE is set or not. It also displays what will be listed when that breakpoint is reached, or during a TRACE. If a '*' is displayed, then no information is displayed.

Example 14 TABLE

output:

ADDRESSLIST-INFO

024F0 -breakpoint at 024F0 no data listed

02343 RXH -bp at 02343, X listed in hex

126E6 A 43F76 50C-see (a) TRACE RAD -Trace on and

list acc in decimal

This lists 50 bytes from address 3F76 in BANK 4. The data listed is in character format.

TRACE

Command is used to either turn the TRACE on or off, and the LIST information is also defined here. The trace output is activated when a JUMP or GO command is entered.

Entering the list information is exactly the same as in the BP command.

Example 15 TRACE ON N

This sets the TRACE with no information to be listed.

Because of the way the TRACE works, every 1/50th of a second the program is interrupted and the system displays current position and any list information required.

It does NOT display information at every 6502 command. The data outputed by the TRACE cannot be sent to printer. When a TRACE is on, speed of execution is delayed. Control of the amount of dealy is via the DELAY command.

WHERE

This command lists the current address at which the program being debugged has been stopped.

Example 16 WHERE

WINDOW

If your program does direct access to the screen, you may want to have only

a small part of the screen disrupted by output from the Analyser. This is done via this command, and defines a window as in the Basic command.

Example 16 WINDOW

upper border ... 15 left border ... 15 right border ... 25

This defines a window of height four, length 10 in the middle of the screen.

You can reset this using the RESET command or by pressing HOME twice.

Further Points

A message of 'EXTERN BRK ...' means that a BRK command has been encountered which was not set up by the Analyser.

As far as I know there is only one place you can't put a breakpoint: on the command JSR \$FF7D. This is due to the way this KERNAL program works. There could be others, as you get to know this program, you will probably find similar situations.

Example 5 will restart execution from the latest breakpoint encountered which was set by the Analyser. It won't start execution from an externally set breakpoint (i.e. a BRK command you have to put in yourself).

PROGRAM: ANALYSER 128

10 BANK 0 20 COLOR 0.1:COLOR 4,1:COLOR 5,8
30 PRINT"[CLEAR] ANALYS ANALYS 40 PRINT" 50 PRINT "CDOWN)CDOWN)CDOWN)CDOW ADDRESS ==> S NJEDOWNJ 60 SA-59904 70 DD WHILE SA 65205 AND EE-0 80 : READ DI : IF DT < Ø THEN BEGIN IF ABS(DT) <> TT THEN EE 100 =1:ELSETT=0 110 : BEND:ELSE BEGIN 120 : POKE SA,DT:TT=TT+DT PRINT HEXS(SA); "[LEFT][LE 130 FT][LEFT][LEFT]";:SA=SA+1 140 : BEND 150 LOOP: PRINT 160 IF EE=1 THEN PRINT"[DOWN][DO WN)(DOWN)(DOWN)ERROR IN LINE ";F EEK(65)+PEEK(66)*256;ELSE BEGIN 170 : PRINT"EDOWNJEDOWNJEDOWNJSA UING ANALYSER"

BSAVE "ANALYSER", BO, P59904 TO P65204 190 : PRINT "CDOWNJCDOWNJPROGRAM SAVED" 200 BEND 210 DATA 32,24,250,32,50,253,147 ,14,77,65,67,72,73,78,69,32,-133 220 DATA 67.79.68.69.32.65.78.65 ,76,89,83,69,82,32,86,49,-1089 230 DATA 46,48,13,13,0,169,13,32 ,249,252,169,93,32,249,252,160,-240 DATA 0,32,238,237,160,0,140, 108,235,32,165,234,162,0,189,228 -2160 250 DATA 234,240,75,217,48,2,208 5,200,232,76,62,234,160,0,238,-2231 260 DATA 108,235,232,189,228,234 ,208,250,232,189,228,234,208,229 32,50,-3086 270 DATA 253,13,85,78,75,78,79,8 7,78,32,67,78,77,77,65,78,-1301 280 DATA 68,46,84,89,80,69,32,72 .69,76,80,32,70,79,82,32,-1060 290 DATA 67,79,77,77,65,78,68,83 ,13,13,0,76,37,234,14,108,-1089 300 DATA 235,174,108,235,189,73, 235,141,164,234,189,72,235,141,163,234,-2822 310 DATA 108,163,234,255,0,152,7 2,138,72,162,0,172,227,234,48,31 320 DATA 185,0,2,201,32,208,4,20 0,76,176,234,185,0,2,200,201,-19 330 DATA 32,240,12,201,13,240,7 157,48,2,232,76,187,234,136,140, -1957 340 DATA 227,234,142,226,234,169,32,157,49,2,104,170,104,168,173 226, -2417 350 DATA 234,96,0,255,77,79,78,0,72,69,76,80,0,72,69,76,80,0,87,72,69,-1344
360 DATA 82,69,0,74,85,77,80,0,7 1,79,0,66,80,0,84,82,-929 370 DATA 65,67,69,0,73,82,81,0,6 9,78,68,0,84,65,66,76,-943 380 DATA 69,0,87,73,78,68,79,87, 0,80,82,73,78,84,69,82,-1089 390 DATA 0,83,80,76,73,84,0,82,6 9,83,69,84,0,71,82,65,-1001 400 DATA 80,72,73,67,0,76,73,83, 84,0,68,69,76,65,89,0,-975 410 DATA 67,79,76,79,85,82,0,0,1 09,235,174,235,192,237,168,246,-2064 420 DATA 213,246,241,243,208,247,163,243,136,252,152,239,35,240, 192,249,-3299 430 DATA 234,248,245,249,141,248 46,241,72,252,198,253.0.162 7 89,-2785 440 DATA 166,235,157,80,2,202,16 247,169,0,133,252,133,253,168,1 5865-, 69 450 DATA 10,133,254,169,80,32,10 1,243,169,2,200,32,101,243,173,0 -1942 460 DATA 255,141,81,2,169,0,141, 129, 2, 169, 58, 141, 134, 2, 169, 176,

510 DATA 69,84,32,65,32,66,82,69,65,75,80,79,73,78,84,13,-1046 520 DATA 84,82,65,67,69,32,45,32,83,69,84,32,85,80,32,65,-1006 530 DATA 32,84,82,65,67,69,13,76 73,83,84,32,45,32,76,73,-986 73,83,84,32,45,32,76,73,366 540 DATA 83,84,32,65,78,32,65,82 ,69,65,32,79,70,32,77,69,-1014 550 DATA 77,79,82,89,13,69,78,68 ,32,45,32,69,78,68,32,84,-995 560 DATA 72,69,32,65,78,65,76,89 ,83,69,82,13,71,79,32,45,-1020 970 DATA 32,83,84,65,82,84,32,69 .88,69,67,85,84,73,79,78,-1154 580 DATA 32,65,70,84,69,82,32,65 ,32,66,82,69,65,75,80,79,-1047 590 DATA 73,78,84,13,74,85,77,80 ,32,45,32,69,88,69,67,85,-1051 ,32,45,32,69,88,69,67,85,-1051 600 DATA 84,69,32,70,82,79,77,32 ,65,68,68,82,69,83,83,13,-1056 610 DATA 68,69,76,65,89,32,45,32 ,68,69,76,65,89,32,84,82,-1041 620 DATA 65,67,73,78,71,32,83,80 ,69,69,68,13,77,79,78,32,-1034 630 DATA 45,32,83,87,73,84,67,72 630 DATA 45,32,83,87,73,84,67,72,32,84,79,32,77,79,78,73,-1077
640 DATA 84,79,82,13,73,82,81,32,45,32,83,69,84,32,73,82,-1026
650 DATA 81,32,86,69,67,84,79,82,13,84,65,66,76,69,32,45,-1030
660 DATA 32,76,73,83,84,32,65,76 660 DATA 32,76,73,83,84,32,65,76,76,32,66,82,69,65,75,80,-1066
670 DATA 79,73,78,84,83,32,65,78,68,32,84,82,65,67,69,83,-1122
680 DATA 13,87,73,78,68,79,87,32,45,32,68,69,70,73,78,69,-1021
690 DATA 32,65,78,32,79,85,84,80,85,84,32,87,73,78,68,79,-1121 700 DATA 87,13,83,80,76,73,84,32,45,32,83,80,76,73,84,32,-1033 710 DATA 83,67,82,69,59,78,13,71 .82,65,80,72,73,67,32,45,-1048 720 DATA 32,65,76,76,79,87,32,71 .82,65,80,72,73,67,83,32,-1072 730 DATA 65,78,68,32,84,69,88,84 ,13,82,69,83,69,84,32,45,-1045 740 DATA 32,67,76,69,65,82,32,71 ,82,65,80,72,73,67,44,32,-1009 750 DATA 87,73,78,68,79,87,32,65 ,78,58,32,83,80,76,73,84,-1143 760 DATA 13,67,79,76,79,85,82,32 ,45,32,83,69,84,32,67,79,-1004 770 DATA 76,79,85,82,83,32,79,70 ,32,83,67,82,69,69,78,13,-1079 780 DATA 80,82,73,78,84,69,82,32 45.32.79.85.84.80.85.84.-1154 790 DATA 32,67,69,82,84,65,73,78,32,73,78,70,79,32,84,79,-1077
800 DATA 32,80,82,73,78,84,69,82,13,0,32,150,253,76,37,234,-1375 810 DATA 32,91,253,32,50,253,13, 80,82,79,71,82,65,77,32,65,-1357* 820 DATA 84,32,45,0,165,2,133,25 2,165,4,133,253,165,3,133,254,-1 830 DATA 32,209,238,169,13,32,24 9,252,32,150,253,76,37,234,160,0 2136 840 DATA 32,34,253,153,0,2,200,2 01,13,240,9,192,47,144,241,169,-1930 850 DATA 13,76,243,237,192,1,240 ,6,169,0,141,227,234,96,104,104, E805-860 DATA 76,37,234,32,165,234,20 1,4,176,5,240,3,76,51,238,32,-18 870 DATA 50,253,13,79,78,47,79,7 0,70,46,46,46,0,32,238,237,-1384 880 DATA 76,19,238,173,48,2,201, 79,208,229,173,49,2,201,78,208,-1984

470 DATA 141,135,2,76,128,2,169,

480 DATA 253,32,50,253,13,87,72

6,141,0,255,76,37,234,32,91,-152

69,82,69,32,45,32,80,82,79,-1330 490 DATA 71,82,65,77,32,67,85,82 ,82,69,78,84,76,89,32,83,-1154

500 DATA 84,79,80,80,69,68,32,65 ,84,13,66,80,32,45,32,83,-992

1769

890 DATA 6,169,1,141,81,238,96,2 01,70,208,212,169,0,141,81,238,-

900 DATA 96,255,32,165,234,208,2 0,32,50,253,13,65,68,68,82,69,-1

910 DATA 83,83,46,46,0,32,238,23 7,76,82,238,160,0,201,6,176,-170

920 DATA 230,201,4,144,226,208,7,169,63,133,252,76,143,238,173,4 8.-2315

930 DATA 2,32,198,238,201,16,176 ,207,170,189,182,238,133,252,200 -2596

940 DATA 1,185,48,2,32,198,238,2 01,16,176,188,10,10,10,10,149,-1

950 DATA 253,200,185,48,2,32,198 238, 201, 16, 176, 171, 24, 117, 253, 1 49.-2263

8,88,055,81,505,005,625 ATAG 088 3,127,191,255,22,86,150,214,42,1 6455-.80

970 DATA 170,234,6,10,1,0,56,233,48,201,10,144,3,56,233,7,-1412,980 DATA 96,138,72,32,239,251,32 254,238,173,253,238,32,249,252, -2714 165.

990 DATA 254,32,236,238,165,253 32,236,238,104,170,96,32,254,238

1000 DATA 252,238,32,249,252,173 ,253,238,32,249,252,96,0,255,72,

1010 DATA 240,74,74,74,74,32,21, 239,141,252,238,104,41,15,32,21, -1672

1020 DATA 239,141,253,238,96,201,10,144,3,24,105,7,24,105,48,96,

1030 DATA 173,252,238,32,198,238 ,10,10,10,10,141,59,239,173,253, 855

1040 DATA 32,198,238,24,109,59,2 39,141,59,239,96,255,138,72,152, -2123

1050 DATA 160,2,169,0,153,113,23* 9,136,16,250,173,59,239,56,233,1 0.-2008

1060 DATA 144,21,238,114,239,172 114,239,192,10,208,241,238,113, 239.160.-2682

1070 DATA 0,140,114,239,76,77,23 9,105,10,141,115,239,104,168,104 170.-2041

1080 DATA 96,255,0,255,169,0,206 ,113,239,48,6,24,105,100,76,118,

1090 DATA 239,205,114,239,48,5,2 ,105,10,76,129,239,206,115,239, EP05-.8F

1100 DATA 6,24,105,1,76,140,239 96,32,91,253,32,50,253,13,13,-14

1110 DATA 65,68,68,82,69,83,83,3 2,32,32,32,76,73,83,84,45,-1007 1120 DATA 73,78,70,79,13,0,162,0 ,189,166,245,142,34,240,240,46.

2

Ø

0

1130 DATA 201,42,240,52,189,167, 245,133,252,189,168,245,133,253, -2867

1140 DATA 245,133,254,32,209,238 32,50,253,32,32,32,32,32,32,0,-1538

1150 DATA 189,175,245,32,249,252 ,201,13,240,4,232,76,224,239,173 34 -2578

1160 DATA 240,24,105,23,170,76, 84,239,173,58,248,240,31,32,50,2 53, -2146

1170 DATA 84,82,65,67,69,32,32,3 2,32,32,32,0,162,0,189,59,-969 1180 DATA 248,32,249,252,201,13 240,4,232,76,14,240,32,150,253,7 6,-2312

1190 DATA 37,234,0,32,165,234,24 0,4,201,3,144,25,32,50,253,13,-1 667

1200 DATA 85,80,80,69,82,32,66,7 9,82,68,69,82,46,46,0,32,-998 1210 DATA 238,237,76,35,240,32,2

47,240,201,24,176,224,141,244,24 0.32,-2627

1220 DATA 165,234,240,4,201,3,14 4,25,32,50,253,13,76,79,87,69,-1

1230 DATA 82,32,66,79,82,68,69,8 2,46,46,0,32,238,237,76,79,-1314 1240 DATA 240,32,247,240,201,1,1 44,224,205,244,240,144,219,141,2 43,240,-3005

1250 DATA 32,165,234,240,4,201, ,144,24,32,50,253,13,76,69,70, 610

1260 DATA 84,32,66,79,82,68,69,8 2,46,46,0,32,238,237,76,128,-136

1270 DATA 240,32,247,240,201,40, 176,225,141,245,240,32,165,234,2 40,4,-2702 1280 DATA 201,3,144,25,32,50,253

13,82,73,71,72,84,32,66,79,-128

1290 DATA 82,68,69,82,46,46,0,32 238,237,76,171,240,32,247,240,-1906

1300 DATA 201,1,144,224,205,245 240,144,219,141,246,240,169,147, 32,249,-2847

1310 DATA 252, 162, 3, 189, 243, 240 149,228,202,16,248,169,147,32,24 9,252,-2781

1320 DATA 76,37,234,72,162,0,142 138,72,162,0,142,113,239,142,11 -1845

1330 DATA 239,173,226,234,201,3, 144,10,173,48,2,32,198,238,141,1 13,-2175

1340 DATA 239,232,201,1,240,10,1 89,48,2,32,198,238,141,114,239,2 32,-2356

1350 DATA 189,48,2,32,198,238,14 ,115,239,104,170,76,116,239,32, 52,-1991

1360 DATA 241,76,37,234,173,244 249,141,226,242,32,165,234,208,2

5,32,-2559 1370 DATA 50,253,13,79,85,84,80, 85,84,32,40,65,47,82,41,46,-1166 1380 DATA 46,0,32,238,237,76,58, 241,173,48,2,201,42,240,94,201,

1390 DATA 82,240,4,201,65,208,21 ,141,86,243,162,32,142,87,243,2 01,-2353

1400 DATA 65,208,3,76,32,242,32, 165,234,173,48,2,162,4,221,155, 1822

1410 DATA 241,240,29,202,16,248, 32,50,253,13,82,69,71,73,83,84,-

1420 DATA 69,82,46,46,0,32,238,2 37,76,118,241,83,65,88,89,80,-15 90

1430 DATA 141,88,243,169,32,141 89,243,32,228,242,141,90,243,169

1440 DATA 141,91,243,173,100,243 240,6,169,0,141,100,243,96,173,

1450 DATA 246,240,10,173,206,247 ,208,5,169,83,141,244,249,32,91, 1460 DATA 224,4,208,22,32,50,253

,13,83,84,65,67,75,32,80,79,-137

1470 DATA 73,78,84,69,82,61,0,76,17,242,224,0,208,19,32,50,-1315,1480 DATA 253,13,83,84,65,84,85, 83,32,82,69,71,61,0,76,17,-1158 1490 DATA 242,169,13,32,249,252 189,155,241,32,249,252,169,61,32 ,249,-2586

1500 DATA 252,181,5,32,22,243,32 ,150,253,173,226,242,141,244,249 95. -2541

1510 DATA 32,82,238,174,226,234, 224,4,208,5,169,32,141,92,243,20

1520 DATA 189,48,2,157,88,243,20 2,16,247,169,32,141,93,243,32,16 -2067

1530 DATA 234,208,19,32,50,253,1 3.75.69.78.71.84.72.46.46.0.-135

1540 DATA 32,238,237,76,62,242,2 01,4,176,233,170,141,166,246,202 189. -2615

1550 DATA 48.2.157.94.243.202.16 247,32,247,240,141,227,242,32,2 28,-2398

1560 DATA 242,169,32,172,166,246 153,94,243,173,48,2,153,95,243, 169. -2400

1570 DATA 13,153,96,243,173,100, 243,240,21,169,0,141,100,243,96,

1580 DATA 212,246,240,10,173,206 ,247,208,5,169,83,141,244,249,32 91. -2556

1590 DATA 253,169,13,32,249,252 162,0,160,0,32,209,238,169,62,32 SE05-

1600 DATA 249,252,32,134,243,32 22,243,200,232,236,227,242,240,2 5,192,-2801

1610 DATA 8,144,239,169,13,32,24 9,252,165,253,24,105,8,133,253,1 65,-2212

1620 DATA 254,105,0,133,254,76,1 68,242,32,150,253,173,226,242,14 1,244,-2693

1630 DATA 249,96,208,25,32,165,2 34,208,25,32,50,253,13,77,79,68, 1814

1640 DATA 69,32,40,72,47,68,47,6 7,41,46,46,0,32,238,237,76,-1158 1650 DATA 228,242,173,48,2,201,7 2,240,8,201,67,240,4,201,68,208, F055-

1660 DATA 216,141,21,243,96,72,1 41,59,239,152,72,173,21,243,201, 68,-2158

1670 DATA 240,22,201,67,208,9,4 3,59,239,32,249,252,76,78,243,17 -2321

1680 DATA 59,239,32,236,238,76,7 8,243,32,60,239,160,0,165,113,23 9. -2229

1690 DATA 32,254,238,173,253,238 ,32,249,252,200,192,3,144,239,16 9,32,-2700

1700 DATA 32,249,252,104,168,95, 0,255,0,255,0,255,0,255,0,255,-2

1710 DATA 72,142,157,243,169,72, 142,162,243,169,253,141,185,2,16 5.252,-2569

1720 DATA 32,239,251,170,169,119 ,141,144,2,169,255,141,145,2,104 32,-2115

1730 DATA 23,253,174,162,243,96, 142,162,243,165,252,32,239,251,1 70,169,-2776

1740 DATA 116,141,144,2,169,255, 141,145,2,169,253,32,23,253,174, 162.-2181

1750 DATA 243,96,73,32,50,253,1 73,82,81,32,65,68,68,82,69,-138

1760 DATA 83,83,32,61,32,0,162,2 ,189,230,243,149,252,202,16,248, -1992

1770 DATA 32,209,238,32,50,253,1 3,78,69,87,32,65,68,68,82,69,-14

1780 DATA 83,83,32,61,32,0,32,23 8,237,32,82,238,165,252,141,238,

1790 DATA 243,165,253,141,239,24 ,165,254,141,240,243,76,37,234, 32,126,-2832

1800 DATA 252,32,82,238,165,252 41,64,240,5,169,127,76,1,244,169 ,-2157

1810 DATA 53,133,252,32,19,238,1 73,81,238,208,3,76,83,245,32,143

1820 DATA 247,208,59,162,0,189,1 66,245,201,0,240,50,201,42,240,8

1830 DATA 138,24,105,23,170,76,2 1,244,32,50,253,13,78,79,32,83,-

1840 DATA 80,65,67,69,32,84,79,3 2,68,69,70,73,78,69,32,66,-1033 1850 DATA 82,69,65,75,80,79,73, 8,84,13,0,76,37,234,142,167,-135

1860 DATA 246,165,252,157,167,24 5,165,253,157,168,245,165,254,15

7,169,245,-3210 1870 DATA 160,0,32,134,243,157,1 70,245,232,200,192,3,144,244,169

1880 DATA 168,32,101,243,174,167 246,189,170,245,41,15,240,24,20

1890 DATA 240,40,141,166,246,41 0,200,3,76,227,244,173,166,246,4

1900 DATA 4.240.33,76,196,244,18 * 9,170,245,240,25,201,32,240,37,2

1910 DATA 64,240,17,201,95,240,1 3,76,227,244,189,170,245,41,16,2

-2319 1920 DATA 50,76,196,244,169,234, 157,171,245,157,172,245,169,1,15

166.-2609 1930 DATA 245,76,201,244,169,3,1 57,166,245,142,34,240,32,73,248, 160,-2435

DATA 0,174,34,240,185,86,24 3,157,175,245,232,200,192,14,144

244 -2565 1950 DATA 76,37,234,169,234,157 172,245,169,2,157,166,245,189,17

0,245,-2667 1960 DATA 41,15,208,213,189,170, 245,201,224,240,206,201,160,240,

202,201,-2956 1970 DATA 192,240,198,189,171,24 5,41,128,240,30,169,254,56,253,1 71.245.-2822

1980 DATA 141,166,246,189,168,24 5,56,237,166,246,157,173,245,189 169,245,-3038

1990 DATA 233,0,157,174,245,76,7 5,245,189,168,245,24,125,171,245 157,-2529

2000 DATA 173,245,189,169,245,10 5,0,157,174,245,189,173,245,24,1 05.2.-2440

2010 DATA 157,173,245,189,174,24 5,105,0,157,174,245,169,4,157,17 1,245,-2610

2020 DATA 76,201,244,32,143,247 240,40,169,0,157,166,245,160,0,1 89,-2309

2030 DATA 170.245,32,101,243,32, 50,253,13,66,82,69,65,75,80,79,

1655

2040 DATA 73,78,84,32,82,69, 9,86,69,68,13,0,76,37,234,-1157 2050 DATA 32,50,253,13,78,78,32 66,82,69,65,75,80,79,73,78,-1204 2060 DATA 84,32,65,84,32,84,72 3,83,32,65,68,68,82,69,83,-1076 2070 DATA 83,13,0,76,37,234,83,1 3,0,76,37,234,0,255,0,255,-1396 2080 DATA 0,255,0,255,0,255,0,25 5,0,255,0,255,0,255,0,255,-2040 2090 DATA 0,255,0,255,0,255,0,25 5,0,255,0,255,0,255,0,255,-2040 2100 DATA 0,255,0,255,0,255,0,25 5,0,255,0,255,0,255,0,255,-2040 2110 DATA 0,255,0,255,0,255,0,25 5,0,255,0,255,0,255,0,255,-2040 2120 DATA 0,255,0,255,0,255,0,25 5,0,255,0,255,0,255,0,221,-2006 2130 DATA 0,255,0,255,0,255,0,25 5,0,255,0,255,0,255,0,255,-2040 2140 DATA 0,255,0,255,0,255,0,25 5,0,255,0,255,0,255,0,255,-2040 2150 DATA 0,255,0,255,0,255,0,25 5,0,255,0,255,0,255,0,255,-2040 2160 DATA 0,255,0,255,0,255,0,25 5,0,255,0,255,0,255,0,255,-2040 2170 DATA 0,255,0,255,0,255,0,25 5,0,255,0,255,0,255,0,255,-2040 2180 DATA 0,255,0,255,0,255,0,25 5,0,255,0,255,0,255,0,255,-2040 2190 DATA 0,255,0,255,0,255,0,25 5,0,255,0,255,0,255,0,255,-2040 2200 DATA 0,255,0,255,0,255,0,25 5,0,255,0,255,0,255,0,255,-2040 2210 DATA 0,255,0,255,0,255,0,25 5,0,255,0,255,0,255,0,255,-2040 2220 DATA 0.255,0,255,0,255,0,25 5,0,255,0,255,0,255,0,255,-2040 2230 DATA 0,255,0,255,0,255,0,25

2240 DATA 32,239,251,133,2,165,2 53,133,4,165,254,133,3,169,1,141 -2078

2250 DATA 212,246,169,113,141,14 4,2,169,255,141,145,2,169,76,141 143,-2268

2260 DATA 2,76,135,2,141,173,206 247,208,44,32,50,253,13,78,79,-

2270 DATA 84,32,83,84,79,80,80,6 9,68,32,66,89,32,65,32,83,-1058 2280 DATA 89,83,84,69,77,32,66,8 2,69,65,75,80,79,73,78,84,-1185 2290 DATA 46,13,0,76,37,234,169, 0,141,206,247,165,2,133,252,165,

2300 DATA 3,133,254,165,4,133,25 3,32,143,247,208,3,76,128,245,14 -2169

2310 DATA 34,240,160,17,185,125 247,153,80,2,136,16,247,165,2,14 1.-1950

2320 DATA 83,2,160,0,189,170,245 ,153,89,2,232,200,192,3,144,244,

2330 DATA 174,34,240,189,168,245 ,24,125,166,245,141,93,2,189,169 245, -2449

2340 DATA 105,0,141,94,2,189,173 ,245,141,96,2,189,174,245,141,97 -2034

2350 DATA 2,162,4,189,120,247,15 7,0,2,202,16,247,162,0,142,227,-

2360 DATA 234,76,168,246,141,0,2 55,76,48,50,53,48,13,8,72,169,-1 657

2370 DATA 0,141,0,255,104,40,234 234,234,76,0,0,76,0,0,165,-1559 2380 DATA 252,41,64,240,5,169,12 7,76,156,247,169,63,141,207,247, -2366

2,85,045,245,240,09,189,166,245,240,29,2 01,42,240,33,189,167,245,205,207

247, -2645

2400 DATA 208,17,189,168,245,197,254,253,208,10,189,169,245,197,254, 200,3,-2760

2410 DATA 169,1,96,138,24,105,23,170,76,161,247,169,0,96,76,167, -1718

2420 DATA 32,19,238,173,81,238,2 08,58,173,58,248,208,21,32,50,25

2090 2430 DATA 13,84,82,65,67,69,32,7 8,79,84,32,78,78,13,0,76,-931 2440 DATA 37,234,169,0,141,58,24

8,32,50,253,13,84,82,65,67,69,-1 2450 DATA 32,83,87,73,84,67,72,6

9,68,32,78,70,70,13,0,76,-975 2460 DATA 37,234,169,1,141,100,2 43,141,58,248,32,73,248,162,13,1 89,-2089

2470 DATA 86,243,157,59,248,202, 16,247,32,50,253,13,84,82,65,67, -1904

2480 DATA 69,32,83,69,84,13,0,76 ,37,234,84,13,0,76,37,234,-1141 2490 DATA 0,255,0,255,0,255,0,25 5,0,32,165,234,208,32,32,50,-177

2500 DATA 253,13,76,73,83,84,47 78,79,76,73,83,84,32,40,76,-1250 2510 DATA 47,78,41,32,46,46,46,0 ,32,238,237,76,73,248,173,48,-14

2520 DATA 2,201,76,240,15,201,78,208,213,169,42,141,86,243,169,1 3.-2097

2530 DATA 141,87,243,96,169,1,14 1,100,243,32,52,241,96,32,165,23 -2073

2540 DATA 208,34,32,50,253,13,69 ,78,84,69,82,32,76,73,78,69,-130

2550 DATA 32,80,79,83,73,84,73,7 9,78,32,46,46,46,0,32,238,-1101 2560 DATA 237,76,141,248,201,3,1 76,218,32,247,240,201,25,176,211

2570 DATA 10,10,24,105,47,162,52 ,134,253,162,10,134,254,162,0,13

2580 DATA 252,160,0,32,101,243,3 2,50,253,13,71,82,65,80,72,73,-1

2590 DATA 67,32,89,69,84,13,0,76 37,234,32,165,234,200,26,32,-13

2600 DATA 50,253,13,78,79,32,79 70,32,76,73,78,69,83,32,46,-1143 2610 DATA 46,46,0,32,238,237,76, 234,248,201,3,176,226,32,247,240 -2282

2620 DATA 201,23,176,219,141,114,249,32,175,249,169,83,141,244,249,169,-2634

2630 DATA 147,32,249,252,32,115, 249,173,114,249,240,67,133,229,1 69,147,-2597 69,147

2640 DATA 32,249,252,32,50,253,4 5,45,45,45,45,45,45,45,45,45,-13

2650 DATA 45,45,45,45,45,45,45,4 5,45,45,45,45,45,45,45,45,-720 2660 DATA 45,45,45,45,45,45,45,4 5,45,45,45,45,45,0,173,-803

2670 DATA 114,249,24,105,1,141,1 14,249,133,229,169,147,32,249,25 2,76,-2284 2680 DATA 37,234,32,162,3,181,22 4,157,157,249,101,232,157,161,24 9,202,-2618 2690 DATA 16,243,165,236,141,165,249,96,162,3,181,224,157,166,24 9.181.-2634 2700 DATA 232,157,170,249,202,16,243,165,236,141,174,249,96,165,236,141,-2872 2710 DATA 180,249,96,255,0,255,0 ,255,0,42,0,255,0,255,0,72,-1914 2720 DATA 169,0,133,230,133,229, 169, 39, 133, 231, 169, 24, 133, 228, 10 4,96,-2220 2730 DATA 32,19,238,32,50,253,13 ,80,82,73,78,84,69,82,32,0,-1217 2740 DATA 173,81,238,240,15,169, 80,141,244,249,32,50,253,79,78,1 2750 DATA 0,76,37,234,169,83,141 244,249,32,50,253,79,70,70,13,-1800 2760 DATA 0,76,37,234,70,32,175 249, 169, 147, 32, 249, 252, 169, 47, 16 2,-2100 2770 DATA 52,134,253,162,10,134 254,162,0,134,252,160,0,32,101,2 -5083 2780 DATA 169,0,141,114,249,76,3 7,234,162,0,169,0,157,166,245,13 -2057 2790 DATA 24,105,23,176,4,170,76 ,26,250,233,23,169,42,157,166,24 5.-1889 2800 DATA 169,0,141,212,246,141, 58,248,141,100,243,141,206,247,1 41,114,-2548 2810 DATA 249,169,83,141,244,249 ,162,41,189,134,250,157,112,2,20 2,16,-2400 2820 DATA 247,173,0,255,141,113 2,141,121,2,141,148,2,169,112,14 -1908 2830 DATA 22,3,169,2,141,23,3,12 0,32,120,252,173,22,3,24,105,-12 2840 DATA 8,141,20,3,173,23,3,10 5,0,141,21,3,88,169,153,141,-119 2850 DATA 162,254,141,163,254,96 ,169,6,141,0,255,76,176,250,169, 6.-2318 2860 DATA 141,0,255,76,47,251,16 9,0,141,0,255,76,0,0,72,169,-165 2870 DATA 0,141,0,255,104,32,0,0 ,72,169,63,141,0,255,104,96,-143 2880 DATA 169,1,141,205,247,169 0,141,212,246,32,255,251,32,207, 251,-2560 2890 DATA 88,32,91,253,165,4,56 233,2,133,4,133,253,165,3,233,-1 848 2900 DATA 0,133,3,133,254,165,2, 133,252,32,143,247,240,51,160,0,

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3.-213B

46. -2281

2950 DATA 65,84,32,45,32,0,32,20 9,238,32,150,253,76,37,234,173,

2910 DATA 189,175,245,153,0,2,20 0,232,192,14,144,244,32,50,253,1 2920 DATA 83,84,79,80,80,69,68,3 2,65,84,32,45,32,0,32,209,-1074 2930 DATA 238,169,13,32,249,252 3210 DATA 169,101,141,20,3,169,2 50,141,21,3,88,169,0,133,252,133 -1793169,0,141,227,234,32,150,253,76 ,169,3,32,101,243,169,10,133,254 2940 DATA 241,32,50,253,13,69,88 ,84,69,82,78,32,66,82,75,32,-134 101,-2101 3230 DATA 243,32,50,253,13,65,78

2950 DATA 212,246,240,126,173,58 ,248,240,94,32,255,251,32,207,25 1.165.-2830 2970 DATA 3,133,254,165,4,133,25 3,165,2,133,252,32,50,253,13,67, 1912 2980 DATA 72,69,67,75,73,78,71,3 2,73,78,32,65,84,32,45,32,-978 2990 DATA 0,32,209,238,169,13,32 ,249,252,162,13,189,59,248,157,0 3000 DATA 2,202,16,247,162,0,142 ,227,234,32,52,241,32,34,252,172 -2047 3010 DATA 119,252,162,0,202,208, 253,136,208,250,162,0,161,3,72,2 32,-2440 3020 DATA 224,6,208,248,165,2,72 165,213,201,63,240,38,173,238,2 43,-2499 3030 DATA 141,129,2,173,239,243. 141,134,2,173,240,243,141,135,2, 76,-2214 3040 DATA 128,2,169,0,141,129,2 169,101,141,134,2,169,250,141,13 5.-1813 3050 DATA 2,208,236,32,207,251,1 69,0,141,212,246,88,76,37,234,10 4,-2243 3060 DATA 141,237,251,104,141,23 8,251,104,133,2,133,252,162,5,10 4,149,-2407 3070 DATA 3,202,15,250,173,238,2 51,72,173,237,251,72,96,72,173,1 3080 DATA 0,189,182,238,197,252, 240,5,232,224,16,144,244,138,96, 173,-2570 2090 DATA 114,249,240,29,133,229 ,169,24,133,228,32,115,249,162,3 189,-2298 3100 DATA 166,249,149,224,189,17 0,249,149,232,202,16,243,173,174 ,249,133,-2967 3110 DATA 236,96,173,114,249,240 32,56,233,2,133,228,169,0,133,2 29,-2323 3120 DATA 32,136,249,162,3,189,1 57,249,149,224,189,161,249,149,2 32.202.-2732 3130 DATA 16,243,173,165,249,133 236,96,32,165,234,240,4,201,4,1 44.-2335 3140 DATA 29,32,50,253,13,65,7 79,85,78,84,32,40,48,46,46,-1057 3150 DATA 50,53,53,41,46,46,46,0 ,32,238,237,76,72,252,32,247,-15 3160 DATA 240,141,119,252,76,37 234,141,169,101,141,239,243,169, 250,141,-2693 3170 DATA 240,243,169,0,141,238, 243,96,162,0,189,166,245,240,27, -2600 3180 DATA 42,240,31,189,167,245, 133,252,189,168,245,133,253,189, 169,245,-2890 3190 DATA 133,254,160,0,189,170 245,32,101,243,138,24,105,23,170 76. - 2063 3200 DATA 138,252,32,175,249,169 ,3,141,22,3,169,176,141,23,3,120

3240 DATA 68,69,68,13,13,0,76,14 8,235,72,169,210,141,144,2,169, 3250 DATA 255,141,145,2,173,163, 254,32,23,253,104,72,32,23,253,1 2098 3260 DATA 162,254,32,23,253,104, 96,72,169,32,141,143,2,104,32,13 -1755 3270 DATA 2,96,72,169,207,141,14 4,2,169,255,141,145,2,104,32,23, -1704 3280 DATA 253,96,72,138,72,152,7 -2159 -1630 -2088 -2084 1799 189,164,-2996 3.-2193

3520 DATA 152,153,154,155,234,-8

,65,76,89,83,69,82,32,69,78,-137

Listings

Get it right first time with our deluxe program system for the C64.

ou may have noticed that our listings are free of those horrible little black blobs which send you searching around the keyboard for a suitable graphic symbol. You may also have noticed the funny numbers by the side of each line of the listing. Fret no more, it's all part of our easy entry aid.

Instead of those nasty graphics and rows of countless spaces in PRINT statements and strings we use a special coding system. The code, or mnemonic, is always contained in square brackets and you'll soon learn to decipher their meanings.

For example, [SA] would mean type in a Shifted A, or an ace of spades in layman's terms, and [SA10] would mean a row of ten of these symbols.

[S+2] means hold down the shift key and press the plus key twice. It doesn't take a great leap of logic to realise that [C+2] means exactly the same thing except that the Commodore key (bottom left of the keyboard) is held down instead of the shift key.

If more than two spaces appear in a statement then this will be printed as [SPC4] or, exceptionally, [SSPC4]. Translated into English this means press the spacebar four times or in the latter case hold the shift key down while you do it.

A string of special characters could appear as:

[CTRL N, DOWN2, LEFT5, BLUE,

This would be achieved by holding

down the CTRL key as you press N, press the cursor key down twice, the cursor left key five times, press the key marked BLUE while holding down the CTRL key, press the F3 key and, finally hold the Commodore key down while pressing the number two key (C2) would of course make the computer print in brown).

Always remember that you should only have a row of graphics characters on your screen with no square brackets and no commas, unless something like this appears:

[SS],[C*] In this case the two characters should have a comma between them.

On rare occasions [REV T] will appear in a listing. This is a delete symbol and is created by entering the line up to this mnemonic. Then type a closing quotation mark (SHIFT & 2) and delete it. This gets the computer out of quotes mode. Hold down CTRL and press the number nine key (RVSON), type the relevant number of reversed T's and then hold down CTRL and press zero (RVSOFF). Next type another quotation mark and delete it again. Now finish the line and press RETURN.

A list of these special cases is given in the table but remember that only one of these mnemonics will appear outside of a PRINT string: the symbol for pi. This may appear when its value is needed in a calculation so this may look something like:

:CC=2*[PI]*R:

Ignore the square brackets and just type in a shifted upward pointing arrow (ie. the pi symbol).

PROGRAM: SYNTAX CHECKER

5 REM SYTAX CHECKER - ERIC DOYLE

10 BL=10 :LN=70 :SA=49152 20 FOR L=0 TO BL:CX=0:FOR D=0 TO

30 READ A: IF A>255THENPRINT"NUMB ER TO LARGE"; LN+(L*10): STOP 40 CX=CX+A: POKE SA+L*16+D, A: NEXT

50 READ A: IF A> CX THENPRINT"ERR

OR IN LINE";LN+(L*10):STOP 60 NEXT L:SYS 49152:NEW 70 DATA 173,5,3,201,165,208,31,1 20,169,9,141,32,208,141,33,208,1

80 DATA 169,7,141,134,2,169,13,3 2,210,255,169,64,141,4,3,169,168

90 DATA 192,141,5,3,88,96,120,16 9,124,141,4,3,169,165,141,5,1566

100 DATA 3,169,14,141,134,2,141 32,208,169,6,141,33,208,88,96,15

110 DATA 32,124,165,72,138,72,15 2,72,162,0,165,20,133,254,165,21

120 DATA 24,101,254,133,254,189 0,2,240,18,69,254,133,254,232,18

130 DATA 0,2,240,8,24,101,254,13 3,254,232,208,233,169,1,141,134, 2134

140 DATA 2,165,254,74,74,74,74,3 2,156,192,32,210,255,165,254,41,

2054 150 DATA 15,32,156,192,32,210,25 5,169,13,32,210,255,169,13,32,21 0,1995 160 DATA 255,169,7,141,134,2,104 ,168,104,170,104,96,24,105,48,20

1,1832

170 DATA 58,16,1,96,24,105,7,96, 0,0,0,0,0,0,0,0,403

by Eric Doyle

Checksum Program

The hexadecimal numbers appearing in a column to the left of the listing should not be typed in with the program. These are merely checksum values and are there to help you get each line right. Don't worry if you don't understand the hexadecimal system, as long as you can compare two characters on the screen with the corresponding two characters in the magazine you can use our line checking program.

Type in the Checksum Program, make sure that you've not made any mistakes and save it to tape or disk immediately because it will be used with most of the present and future listings appearing in Your Commodore.

At the start of each programming session, load Checksum and run it. The screen will turn brown with yellow characters and each time you type in a line and press the RETURN key a number will appear on the screen in white. This should be the same as the corresponding value in the magazine.

If the two values don't relate to one another, you have not copied the line exactly as printed so go back and check each character carefully. When you find the error simply correct it and press RETURN again.

If you want to turn off the checker simply type SYS49152 and the screen will return to the familiar blue colours. You can then do whatever it was you wanted to do and if this doesn't use the area where Checksum lies you can go back to it with the same SYS command.

No system is foolproof but the chances of two errors cancelling one another out are so remote that we believe our listings are more reliable than any other magazine in the world. So get typing!

Mnemonic	Symbol	Keypress
[RIGHT]		CRSR left/right
[LEFT]		SHIFT & CRSR left/right
[DOWN]		CRSR up/down
[UP]		SHIFT & CRSR up/down
[F1]		f1 key
[F2]		SHIFT & fl key
[F3]		f3 key
[F4]		SHIFT & f3 key
[F5]		f5 key
[F6]		SHIFT & f5 key
[F7]		f7 key
[F8]		SHIFT & f7 key
[HOME]	5	CLR/HOME
[CLR]		SHIFT & CLR/HOME
[RVSON]	R	CTRL & 9
[RVSOFF]		CTRL & 0

Mnemonic	Symbol	Keypress
[BLACK]		CTRL & 1
[WHITE]		CTRL & 2
[RED]	#	CTRL & 3
[CYAN]		CTRL & 4
[PURPLE]		CTRL & 5
[GREEN]	**	CTRL & 6
[BLUE]		CTRL & 7
[YELLOW]	-	CTRL & 8
[POUND]		2
[LARROW]		←
[UPARROW]		1
[PI]		SHIFT &↑
[INST]		SHIFT & INST/DEL
[REV T]		see text
[Cletter]		CBM + letter
[Sletter]		SHIFT + letter

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SOFTWARE

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Plus/4 Cribbage

A number of people seem to be having problems entering our Cribbage program published in our April 1987 issue. There are no problems with this program as printed.

Problems are occuring where people haven't read our Listings page which explains the series of symbols that we use to make program entry easier. If you read the Listings page you will see that a [Cletter] means that you should hold down the Commodore key and press the relevant letter. [S letter] means press SHIFT and the letter. You never type the square brackets.

The only symbols that may cause problems are the [130] and [132]. These are simple the codes for flash on and flash off. Refer to your manual to see how you enter these.

Calling All Hippies

All you aged hippies, or would be hippies who were born too late, will no doubt be overjoyed to hear that Domark has launched the long awaited Baby Boomer edition of the popular Trivial Pursuit computer game. It's priced at £14.95 for the full game version or just £7.95 if you already own the original computer version.

Mark Strachan and Dominic Wheatley of Domark, normally seen in suits and bow ties, celebrated the launch by regressing back to their dim and distant past with a visit to London's Carnaby Street.



We at Your Commodore feel that you can think of some suitably apt caption to go along with a picture of this long haired duo and to back this up we are giving away a fiver to the best caption. Send your witty prose to: Your Commodore, Boomer Caption Competition, 1 Golden Square, London W1R 3AB.

Entries must reach our office by Friday 26 June 1987.

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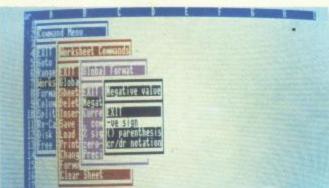
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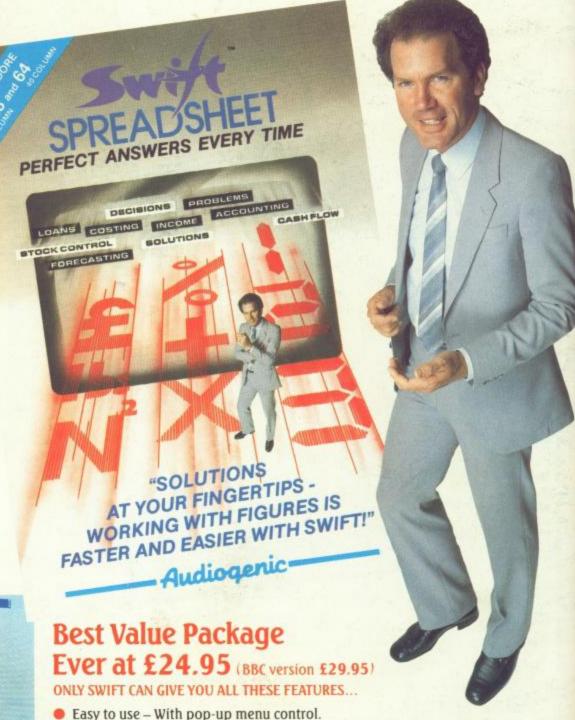
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